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DRAFT

Confirmation Sampling and Analysis Report for Site ST-001, Former Building 408, Gunter Annex



**Maxwell Air Force Base
Alabama**

Prepared For

**Air Force Center for Environmental Excellence
Brooks Air Force Base, Texas**

and

**42 CES/CEVR
Maxwell Air Force Base, Alabama**

November 1997

 **PARSONS
PARSONS ENGINEERING SCIENCE, INC.**

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DRAFT

CONFIRMATION SAMPLING AND ANALYSIS REPORT

FOR

SITE ST-001, FORMER BUILDING 408

GUNTER ANNEX, MAXWELL AFB, ALABAMA

Prepared for:

Air Force Center for Environmental Excellence
Brooks AFB, Texas

and

42 CES/CEVR

Maxwell AFB, Alabama

Contract F41624-92-8036, Delivery Order 17

November 1997

Prepared by:

Parsons Engineering Science, Inc.
1700 Broadway, Suite 900
Denver, Colorado 80290

To: John Ratz @ Parden
From: EDWARD MARCHAND@ERT
Cc:
Bcc:
Subject: Gunter AFB Draft SAR for Site ST-001
Attachment:
Date: 01/19/1998 10:54 AM

John, the following are my comments on the report:

- 1) Page 2-7, third line of section 2.3.1. Suggest changing to read "fuel-related hydrocarbons were in the vados zone..."
- 2) Page 2-9, second paragraph on page. Recommend deleting "Elevated levels of" at the beginning.
- 3) Page 3-5, Section 3.1.4. Reference is to Table 3.1. Should be 4.1 instead.
- 4) Page 3-6, just above section 3.2.1, same comment as in #3.
- 5) Page 3-8, text at the top of the page. The removal of three casing volumes is repeated twice in the same paragraph. Please rework the paragraph.
- 6) Page 3-8, Section 3.2.3.3. What was the rate of groundwater extraction? purging & sampling if different.
- 7) Page 4-4, 6th line from bottom of page. See comment for #3.
- 8) Page 4-7, second paragraph under Section 4.3.1.1. I think the "(Building 406)" needs to be moved up [after "office workers"] rather than after "base housing residents". Also, the word "base" is capatilized and should not be.
- 9) Table 4.3, page 4-10. The ARBCL columns for Residential and Comm/Indus do not match the values in the SAP (Table 3.1). Also in footnote "d" spell out "SSL"
- 10) Page 5-1, second line. Add "or not" between "whether" and "dissolved"
- 11) Table 5.1, footnote a. Delete the TRPH info - TRPH not used.
- 12) Page 5-5, last paragraph on page, first sentence of paragraph. Exchange "contaminant" for "BTEX and naphthalene"
- 13) Page 5-6, last line on page. Recommend changing to "...BTEX contamination are depleted (less than 2 mg/L) relative to background levels (approximately 7 mg/L)."
- 14) Page 5-20. Second to last sentence on page. The text is a repeat of that credited to Vroblasky '94 on noted on page 5-18. Who is right? Do we need both??
- 15) Add blue separator page where Appendix A starts
- 16) Appendix B. Boring SB 08. The data report is in error as does not indicate where the lab sample was taken or when (20-22').

FINAL

**CONFIRMATION SAMPLING AND ANALYSIS REPORT
FOR
SITE ST-001, FORMER BUILDING 408
GUNTER ANNEX, MAXWELL AFB, ALABAMA**

Prepared for:
**Air Force Center for Environmental Excellence
Brooks AFB, Texas**

and

**42 CES/CEVR
Maxwell AFB, Alabama
Contract F41624-92-8036, Delivery Order 17**

March 1999

Prepared by:
**Parsons Engineering Science, Inc.
1700 Broadway, Suite 900
Denver, Colorado 80290**

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ACRONYMS AND ABBREVIATIONS

ΔG_r	Gibbs free energy of the reaction
$\mu\text{g/L}$	micrograms per liter
ADEM	Alabama Department of Environmental Management
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
ARBCA	ADEM risk-based corrective action
ASTM	American Society for Testing and Materials
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAL	corrective action level
CES/CEVR	Civil Engineering Squadron, Environmental Group
CH_4	methane
cm/sec	centimeters per second
CO_2	carbon dioxide
DO	dissolved oxygen
Fe^{2+}	ferrous iron
Fe^{3+}	ferric iron
ft/day	feet per day
ft/ft	foot per foot
ISL	initial screening level
ITS	Intertek Testing Services
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MP	monitoring point
msl	mean sea level
MTBE	methyl tertiary butyl ether
mV	millivolts
N	nitrogen
NFA	no further action
NFRAP	no further response action required
PAH	polynuclear aromatic hydrocarbons
Parsons ES	Parsons Engineering Science, Inc.
ppmv	parts per million, volume per volume
pql	practical quantitation limit
QA/QC	quality assurance/quality control
RBCA	risk-based corrective action
RBSL	risk-based screening level
redox	reduction/oxidation
RNA	remediation by natural attenuation
SAP	sampling and analysis plan
TEH	total extractable hydrocarbons

TMB	trimethylbenzenes
TPH	total petroleum hydrocarbons
TRPH	total recoverable petroleum hydrocarbons
TVH	total volatile hydrocarbons
TVHA	total volatile hydrocarbon analyzer
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOA	volatile organic analysis
VOC	volatile organic compound
VW	vent well

SECTION 1

INTRODUCTION

1.1 PURPOSE

This confirmation sampling and analysis report for Site ST-001, at Gunter Annex, Maxwell Air Force Base (AFB), Alabama has been prepared by Parsons Engineering Science, Inc. (Parsons ES) for submittal to the Alabama Department of Environmental Management (ADEM); the US Air Force Center for Environmental Excellence (AFCEE), Brooks AFB, Texas; and 42 Civil Engineering Squadron, Environmental Group (CES/CEVR), Maxwell AFB, Alabama. ADEM provides oversight of underground storage tank (UST) work at Gunter Annex. This report has been prepared as part of the AFCEE Extended Bioventing Project (Contract F41624-92-8036, Delivery Order 17). The purpose of this report is to document the effectiveness of soil remediation at Site ST-001 and to demonstrate compliance with ADEM risk-based corrective action (ARBCA) guidance for soil and groundwater for site closure.

1.2 PROJECT BACKGROUND

In September 1994, Site ST-001 was selected as a pilot test site for the AFCEE Extended Bioventing Project. This program involves 52 *in situ* bioventing sites at 32 military installations nationwide, and provides funding for pilot- and full-scale bioventing system installation, extended operation of installed bioventing systems, and completion of confirmatory soil sampling and site closure documents, if extended bioventing testing results indicate adequate site remediation has been achieved. A bioventing pilot test was conducted at Site ST-001 under an Option 3 scope of work, awarded as part of the AFCEE Extended Bioventing Project. The initial bioventing pilot testing effort consisted of installing one bioventing air-injection vent well (VW) and three soil gas monitoring points (MPs); collection of initial soil and soil gas samples; performing initial *in situ* respiration tests and fuel biodegradation measurements; air permeability testing; and installing a pilot-scale bioventing system for at least one year of extended operation. Complete bioventing pilot testing results are presented in the *Draft Bioventing Pilot Test Interim Results Report for Site ST-001, Building 408, Gunter Annex, Maxwell AFB, Alabama* (Parsons ES, 1995). The pilot-scale system was operated and monitored for approximately 12 months (from September 1995 to September 1996) under an Option 1 of the AFCEE Extended Bioventing Project. In September 1996, the blower system was shut down to allow soil and soil gas conditions to reach equilibrium. After the 36-day blower shutdown period, final soil gas samples were collected and analyzed, and respiration tests were conducted (Parsons ES, 1997a). The bioventing system was restarted and reoptimized following the completion of the year-end testing. Based on the year-end respiration test and soil

gas sampling results, significant remediation of vadose zone soils had occurred, and the recommendation was made to initiate site closure activities.

Under the AFCEE Extended Bioventing Project, Site ST-001 was funded for confirmation soil sampling (Option 2) to document the effectiveness of soil remediation at the site and to demonstrate compliance with ADEM UST cleanup requirements for site closure. Funds were also provided by AFCEE for groundwater sampling and analysis at the site. In preparation for the confirmation sampling, a site-specific sampling and analysis plan (SAP) was prepared by Parsons ES (1997b) for ADEM, AFCEE, and Maxwell AFB. A copy of the SAP is provided as Appendix A.

Following ADEM, AFCEE, and Maxwell AFB approval of the draft final SAP, confirmation soil and groundwater sampling was conducted at Site ST-001 from 7 through 10 July 1997. Confirmation soil sampling activities consisted of advancing eight boreholes to depths ranging from 21 to 24 feet below ground surface (bgs), and analyzing selected soil samples for lead and hydrocarbon constituents to support site closure. A total of 16 soil samples were submitted for analysis from the eight boreholes. Groundwater sampling included collecting groundwater samples from six monitoring wells and analyzing the samples for lead, hydrocarbon constituents, and other volatile organic compounds (VOCs). In addition, groundwater samples from these wells were analyzed onsite for various geochemical parameters to assess whether or not natural biodegradation of benzene, toluene, ethylbenzene, and xylenes (BTEX) is occurring and to assess the groundwater assimilative capacity for natural attenuation of the remaining concentrations of petroleum hydrocarbon compounds.

1.3 SUMMARY OF CONFIRMATION SAMPLING RESULTS

The analytical results from the 1997 confirmation soil and groundwater sampling event, performed by Parsons ES, and 1998 groundwater sampling events, performed by other contractors, were compared to ADEM Tier 1 Initial Screening Levels (ISLs) and Tier 1 risk-based screening levels (RBSLs) determined for existing and possible future completed receptor exposure pathways. The only current potentially completed exposure pathway is inhalation of vapors migrating from contaminated soil and groundwater into existing residential and office buildings. Soil contaminants may be leaching to groundwater; however, there is no current or expected future beneficial use of groundwater in the vicinity of the site. A possible future migration pathway involving soil contamination is soil vapor intrusion into any future buildings that may be constructed at the currently vacant site.

BTEX; 1,3,5-trimethylbenzene (TMB); 1,2,4-TMB; total volatile hydrocarbons (TVH); total extractable hydrocarbons (TEH); naphthalene; and lead were detected in groundwater samples collected in 1997 and 1998. Of these constituents, toluene, ethylbenzene, naphthalene, and lead exceeded their respective ISLs. There are no ISLs or RBSLs for 1,3,5-TMB, 1,2,4-TMB, TVH, or TEH. Toluene, ethylbenzene, and naphthalene concentrations were below their respective RBSLs for the "inhalation of vapor emissions" exposure pathway. Lead is not a contaminant of concern in this exposure pathway. Benzene, toluene, xylenes, 10 polynuclear aromatic hydrocarbons (PAHs), TVH, TEH, and lead were detected in site soils in 1997. The concentrations of benzene and total xylenes in one soil sample exceeded their respective ISLs, but the

area-weighted average concentrations for benzene and xylenes were below the respective RBSLs. Based on these soil and groundwater analytical results, residual contamination at Site ST-001 does not pose an unacceptable risk to current or future receptors. ADEM has made the determination that no further subsurface investigative or corrective actions will be required for Site ST-001 (ADEM, 1999). The bioventing system has been dismantled and removed from the site, and the VW and MPs have been properly abandoned by a base contractor.

1.4 REPORT ORGANIZATION

This site confirmation sampling and analysis report consists of seven sections, including this introduction, and four appendices. Section 2 includes a brief site description and history, and Section 3 is a description of the confirmation soil sampling activities conducted at the site. Section 4 contains a summary of confirmation sampling analytical results and compares these results to the ADEM ISLs and generic Tier 1 RBSLs. An evaluation of the natural attenuation potential of groundwater at site is presented in Section 5. Section 6 presents conclusions and the recommendation for site closure, and references used in preparation of this report are provided in Section 7.

Appendix A presents a copy of the draft final confirmation SAP for Site ST-001 which includes a detailed summary of previous site investigations. Appendix B provides copies of site borehole logs and groundwater sampling forms. Calculations for the Thiessen Polygon Method used to calculate the area-weighted average of benzene and total xylenes in soil are provided in Appendix C. ADEM reporting forms are provided in Appendix D, and Appendix E presents laboratory analytical data for site environmental and quality assurance/quality control (QA/QC) samples.

SECTION 2

SITE DESCRIPTION AND HISTORY

2.1 SITE LOCATION AND HISTORY

Gunter Annex is located in Montgomery, Alabama, approximately eight miles east of Maxwell AFB. The primary mission of Gunter Annex is computer software development. Site ST-001 is located in the west-central portion of Gunter Annex (Figure 2.1). The site is an open, grassy area bordered by Libby Street on the south and South Hodges Avenue on the west (Figure 2.2). Base housing (Buildings 406, 427, and 428) bounds the site on the remaining sides.

Site ST-001, also known as the old Base Motor Pool Service Station, was originally used for dispensing petroleum products for motorized vehicles beginning in the 1940's. Two 10,000-gallon USTs were located north of Building 408; one tank was used to store diesel fuel, and the other stored gasoline. The tanks and related piping were removed in March 1994. After the tanks were removed, the excavation was backfilled with clean soil and covered with gravel. Building 408 was demolished in 1995, and the site is currently vacant and inactive.

2.2 TOPOGRAPHY, HYDROLOGY, GEOLOGY, AND HYDROGEOLOGY

2.2.1 Topography and Surface Hydrology

The topography of Gunter Annex is basically level with an average elevation of approximately 215 feet above mean sea level (msl). The maximum relief is about 5 feet, along a stream channel near the western section of the installation. Surface runoff from Site ST-001 flows toward Libby Street, and from there flows west toward the small stream channel mentioned above. The stream channel is located approximately 3,000 feet west of the site.

2.2.2 Geology and Hydrogeology

Site ST-001 is underlain by Quaternary alluvial deposits consisting of sand, gravel, silt, and clay layers. The grain size generally increases with depth, with approximately 8 to 10 feet of silty, sandy clay overlying sand and gravelly sand. In the vicinity of the former UST and product piping excavation, much or all of the silty clay appears to have been removed and replaced with clean fill consisting of a mixture of clay, sand, and gravel.

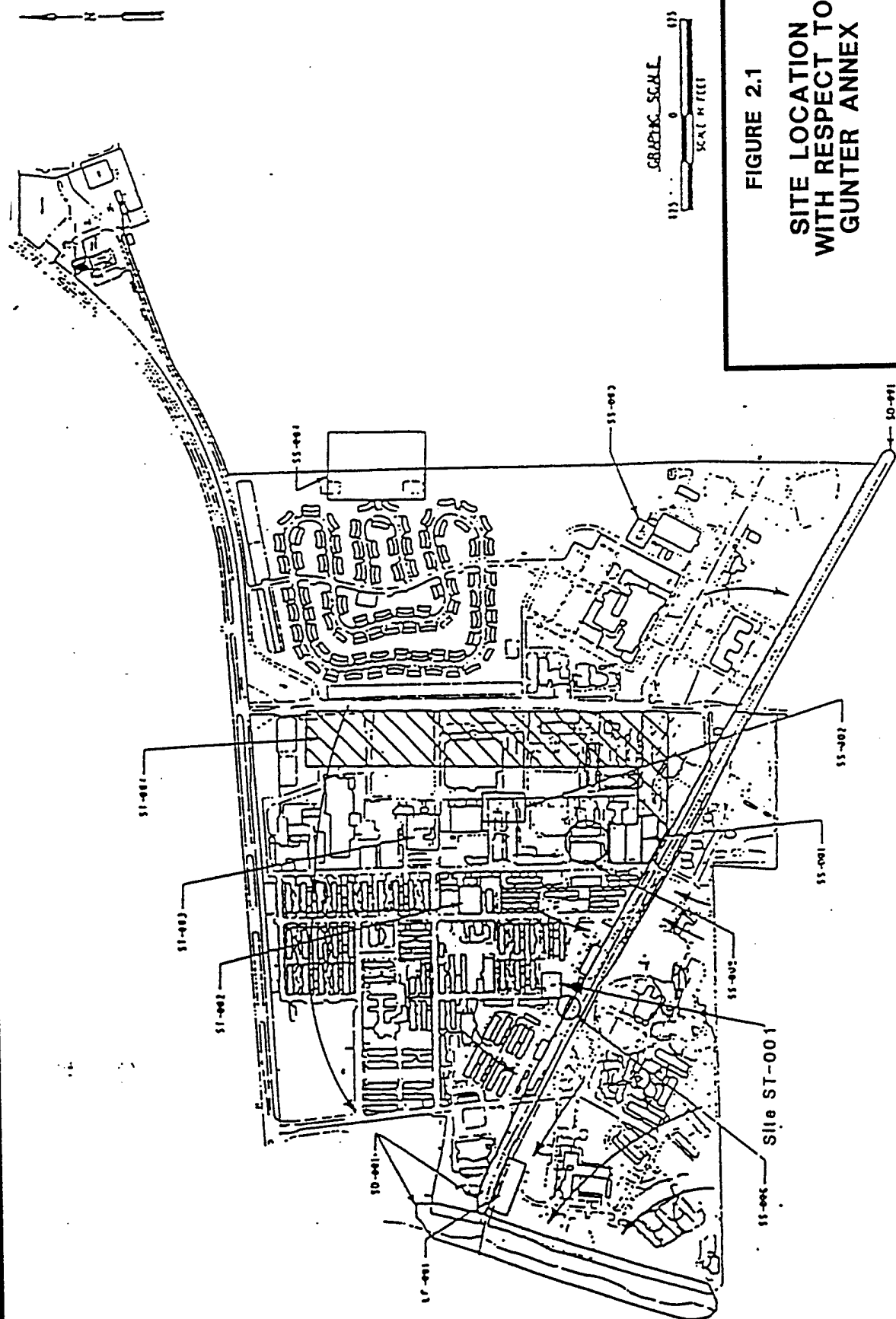
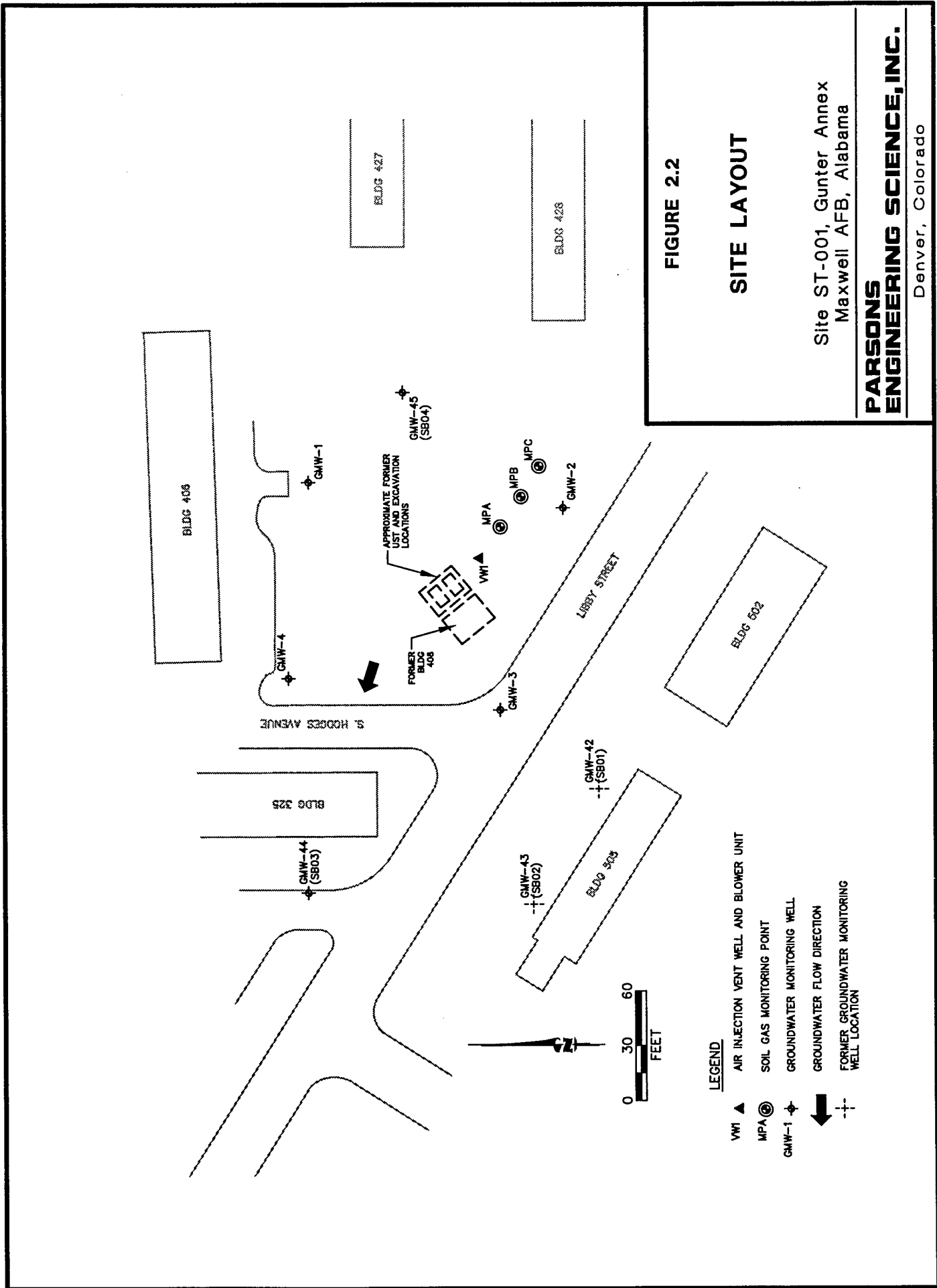


FIGURE 2.1

Site ST-001, Gunter Annex
Maxwell AFB, Alabama

Denver, Colorado



At Site ST-001, shallow groundwater occurs under water table (unconfined) conditions. In July 1997, the surface of the water table was measured between 20 and 23 feet bgs, and groundwater was determined to flow toward the west-northwest with an average hydraulic gradient of 0.0044 foot per foot (ft/ft). Groundwater elevation data for July 1997 are shown on Figure 2.3, and historical groundwater elevations are presented in Table 2.1. The average hydraulic conductivity for the shallow aquifer was determined to be 2.05×10^{-3} centimeters per second (cm/sec) based on a rising-head slug tests performed at wells GMW-42 and GMW-45 (Radian, 1995). The average groundwater flow direction was calculated to be 0.085 feet per day (ft/day) (31 ft/year), based on an average hydraulic conductivity of 2.05×10^{-3} cm/sec (5.8 ft/day), an estimated porosity of 0.30, and an average gradient of 0.0044 ft/ft.

2.3 PREVIOUS INVESTIGATIONS

Previous investigations conducted at Site ST-001 identified BTEX, total petroleum hydrocarbons (TPH), and other organic compounds in soils and groundwater. Because BTEX and TPH were the dominant contaminants identified at Site ST-001, a bioventing system was installed and operated by Parsons ES at Site ST-001 to remediate vadose zone soils. Summaries of the soil and groundwater results from these investigations and bioventing remediation activities are presented in the following section. More complete summaries of previous site investigations are included in the SAP (Appendix A).

2.3.1 Results Summary for Soils

Soil analytical results from the 1991 through 1995 investigations indicated the highest concentrations of total recoverable petroleum hydrocarbons (TRPH) and other fuel-related hydrocarbons were in vadose zone soils in the immediate vicinity of the former USTs. Figure 2.4 shows the estimated extent of TRPH soil contamination at Site ST-001 that originally exceeded the ADEM (1995) corrective action level (CAL) of 100 milligrams per kilogram (mg/kg). Based on results from previous site investigations, soil contamination appeared to exceed the ADEM CAL of 100 mg/kg for TPH in the area circumscribed by GMW-1 through GMW-4. Therefore, the pilot-scale bioventing system was installed in this area, near the former USTs.

Initial and 1-year bioventing pilot test results indicate that the effective treatment area of the bioventing system encompasses the entire area of contaminated soil identified on Figure 2.4. Significant reductions in TVH and BTEX soil gas concentrations, oxygen utilization rates, and fuel biodegradation rates were measured during the sampling event following 1 year of bioventing. Based on this information, TRPH concentrations in vadose zone soils at Site ST-001 were expected to be significantly reduced, and AFCEE recommended that planning for confirmation sampling be initiated while the bioventing pilot-scale system continued to operate.

2.3.2 Groundwater

Dissolved benzene, toluene, and ethylbenzene concentrations in groundwater have exceeded ADEM (1995) criteria of 5, 1,000, and 700 micrograms per liter ($\mu\text{g/L}$),

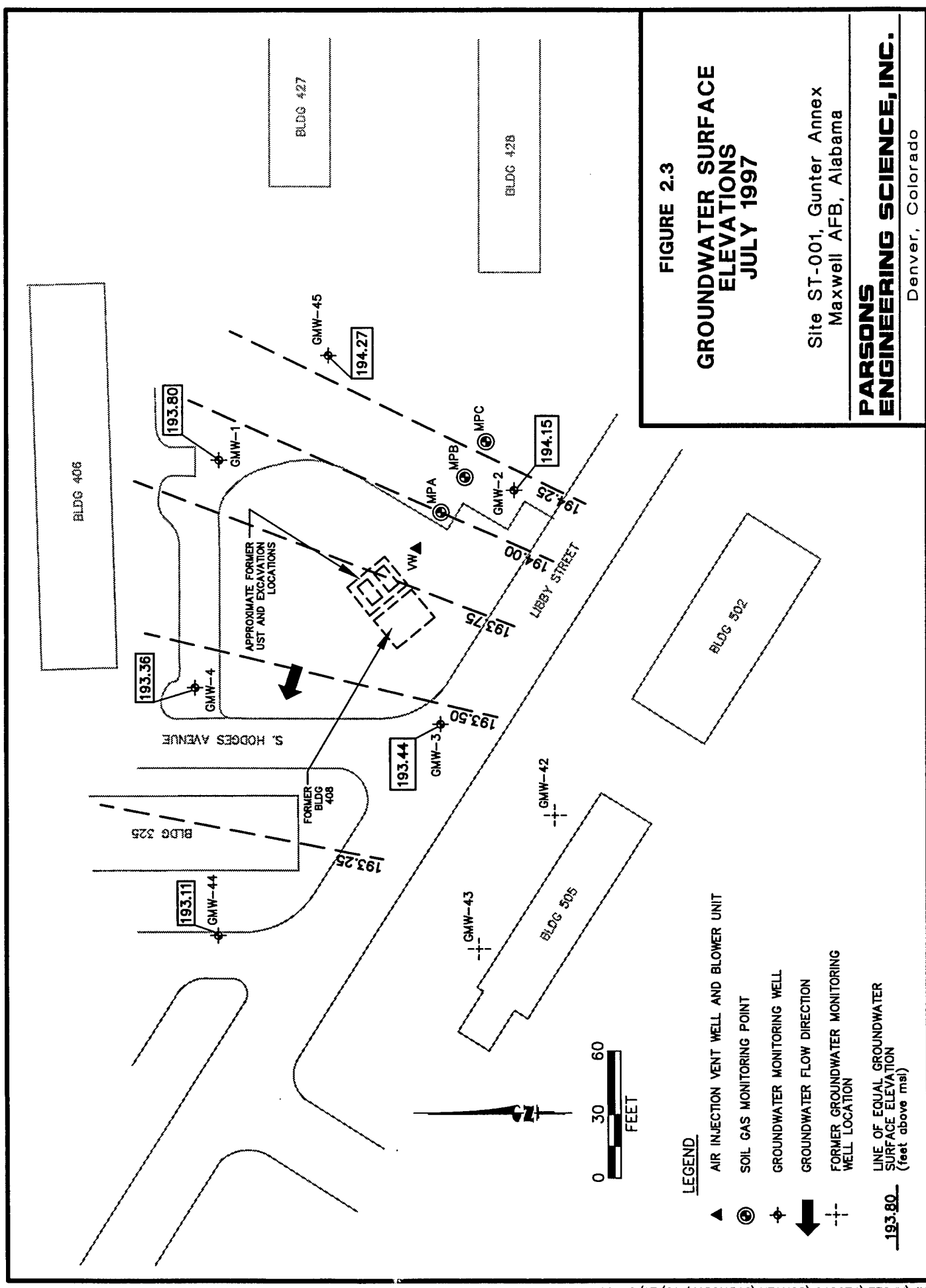
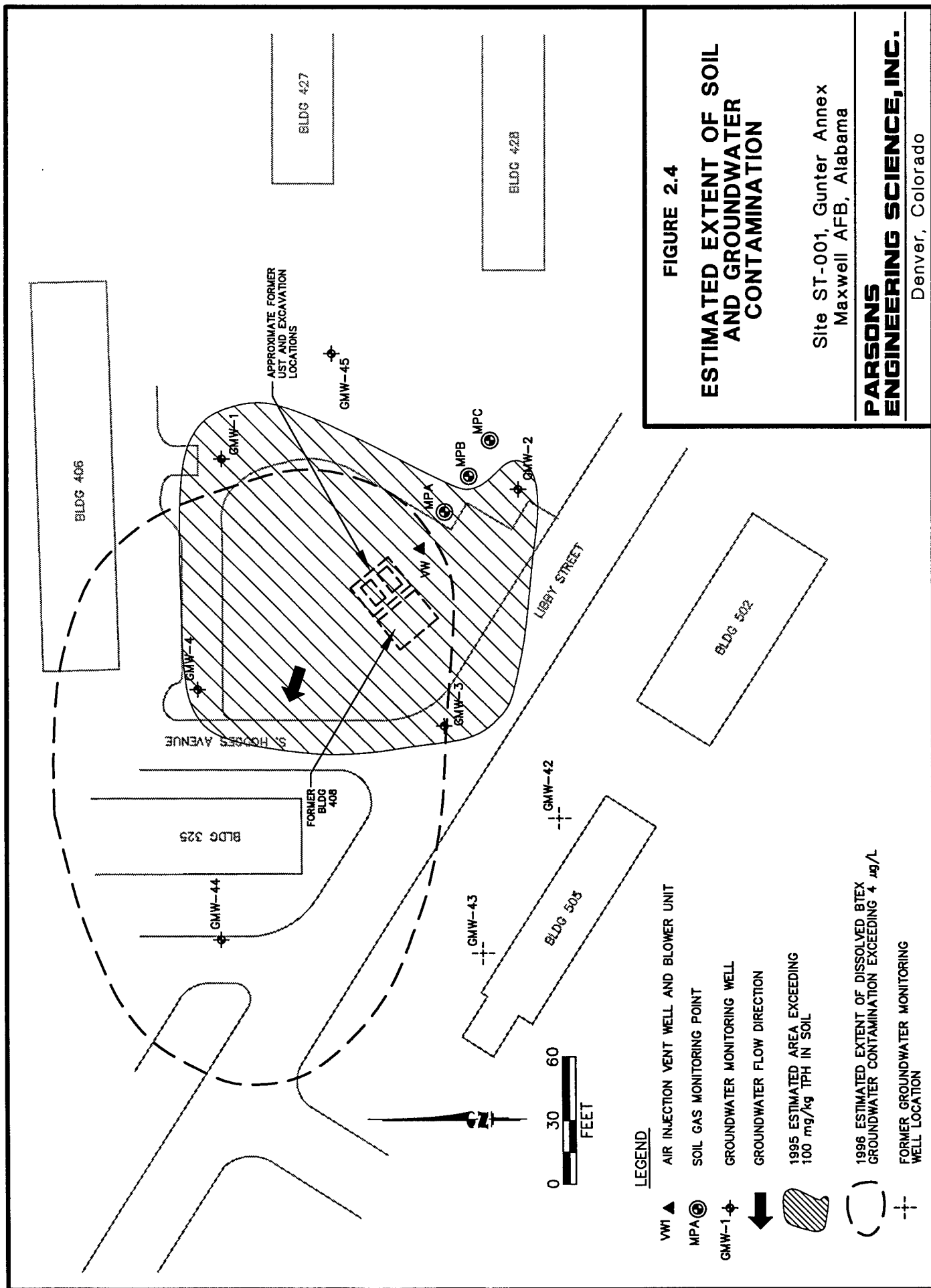


TABLE 2.1
HISTORICAL GROUNDWATER ELEVATIONS
SITE ST-001, GUNTER ANNEX
MAXWELL AFB, ALABAMA

Well Number	TOC Elevation ^{a/} (feet above msl) ^{b/}	Date Measured	Depth to Water (feet below TOC)	Groundwater Elevation (feet above msl)
GMW-1	219.90	9/12/94	27.83	192.07
		7/25/96	25.95	193.95
		7/9/97	26.10	193.80
GMW-2	218.39	9/12/94	25.39	193.00
		7/25/96	24.20	194.19
		7/9/97	24.24	194.15
GMW-3	214.24	9/12/94	22.38	191.86
		7/25/96	20.70	193.54
		7/9/97	20.80	193.44
GMW-4	214.78	9/12/94	23.02	191.76
		7/25/96	21.20	193.58
		7/9/97	21.42	193.36
GMW-42	215.59	9/12/94	23.76	191.83
GMW-43	215.02	9/12/94	23.35	191.67
GMW-44	212.91	9/12/94	21.37	191.54
		7/25/96	19.68	193.23
		7/9/97	19.80	193.11
GMW-45	219.84	9/12/94	27.60	192.24
		7/25/96	25.50	194.34
		7/9/97	25.57	194.27

^{a/} TOC = top of PVC casing.

^{b/} msl = mean sea level.



respectively, during 1991, 1994, and 1996 sampling events. BTEX concentrations from groundwater samples collected in 1996 from GMW-4 and GMW-44 indicate downgradient migration of the contaminant plume (Figure 2.4); dissolved BTEX contamination is estimated to extend approximately 250 feet downgradient from the former USTs (Williams Engineering, Inc., 1996). There is no indication that floating free product has been present on groundwater at the site. One-year bioventing pilot test results strongly indicate that petroleum contamination present in the source area soils has been substantially reduced, and as a result, the hydrocarbon concentrations in the dissolved plume are now thought to be stable, or decreasing.

Lead and trace levels of PAHs and VOCs have been detected in groundwater during previous investigations. Lead and PAH contamination of groundwater is likely the result of gasoline and/or diesel fuel releases from the former USTs. The source of VOCs detected at GMW-45 (Figure 2.4) is unknown. Based on information available from previous site investigations and from personnel at Maxwell AFB, no solvents or other sources of VOCs are known to exist at the former Building 408 site.

SECTION 3

SITE CONFIRMATION SAMPLING AND ANALYSIS ACTIVITIES

The purpose of this section is to summarize site confirmatory soil and groundwater sampling activities, including sampling locations and sampling depths, sampling procedures, analytical methods used, and QA/QC procedures followed. These methods/procedures are described in more detail in the confirmation SAP for Site ST-001 (see Appendix A). The confirmation SAP was implemented by qualified Parsons ES scientists trained in conducting soil and groundwater sampling, records documentation, and chain-of-custody procedures. Environmental sample analyses were provided by Intertek (formerly Inchcape) Testing Services (ITS) of Richardson, Texas.

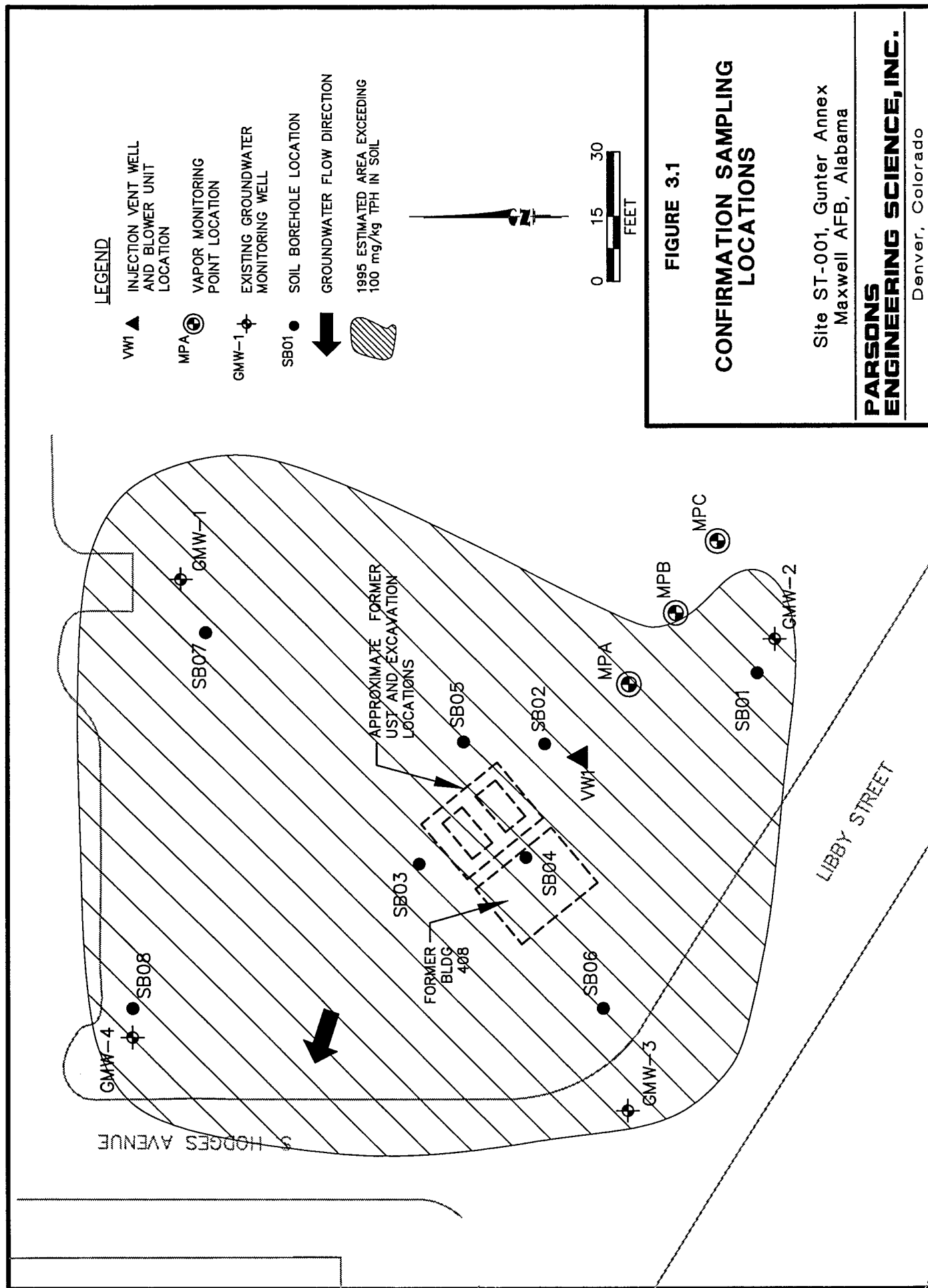
3.1 SOIL SAMPLING PROCEDURES

3.1.1 Borehole Locations and Sampling Depths

Confirmatory soil sampling was conducted at the site on 8 July 1997. Eight boreholes (SB1 through SB8) were advanced at the site, and soil samples were collected to confirm that hydrocarbon concentrations have been remediated to acceptable levels. Figure 3.1 shows the locations of the eight confirmatory soil sampling borehole locations and the previously identified estimated area where TPH concentrations exceeded 100 mg/kg. Borings SB2 through SB5 were advanced in the immediate vicinity of the former USTs and product piping, and the remaining four borings were located in the area where previous investigations identified TPH soil concentrations exceeding the ADEM (1995) CAL of 100 mg/kg. Samples for geologic logging, field total volatile hydrocarbon analyzer (TVHA) screening, and chemical analysis were collected at 5-foot intervals from ground surface to the total depth of each boring, which ranged from 22 to 24 feet bgs.

3.1.2 Drilling, Sampling, and Equipment Decontamination

Boreholes were advanced using a truck-mounted drill rig equipped with 2.25-inch inside-diameter hollow-stem augers. Prior to drilling, the drill rig and other downhole equipment and sampling tools were decontaminated as described in the SAP (Appendix A). Cuttings were temporarily stockpiled adjacent to each borehole and screened with a TVHA. All cuttings had TVHA headspace screening results less than 2.0 parts per million, volume per volume (ppmv) and were used to backfill the boreholes from which they were generated. Rinseate water generated at the drill site during decontamination of the drilling equipment and sampling spoons was discharged onto the ground surface near each borehole. Relatively undisturbed soil samples, suitable for chemical analysis,



were collected at 5-foot intervals from ground surface to the total depth of the boring. Soil samples were collected using a standard split-barrel sampler lowered through the hollow stem of the augers and driven approximately 1.5 feet into undisturbed soil, ahead of the augers. Between sampling events, the split-barrel sampler was cleaned with Alconox[®] detergent, followed by successive potable and distilled water rinses.

A total of 16 confirmatory soil samples were collected at Site ST-001 and submitted for laboratory analysis of BTEX, PAHs, TVH, TEH, and lead. With the exception of SB03 and SB04, two soil samples from each borehole with the highest field TVHA screening results were submitted for laboratory analyses. Only one sample was collected from SB04 because of poor sample recovery, and three samples were collected from SB03 because of relatively high field screening results at three depth intervals.

After collection of each sample, the sampler was retrieved and split apart. The portion of each sample destined for laboratory analyses was immediately placed into pre-cleaned, laboratory-supplied glass containers, labeled, and stored in a chilled condition. The remaining portion of each sample was used for geologic logging and soil headspace screening. Soil headspace samples were screened in the field using a TVHA. The headspace analysis portion of the sample was placed in a clean, 8-ounce, self-sealing plastic bag, sealed, and allowed to equilibrate for approximately 10 minutes. The bag was then pierced with the detector probe of the TVHA, and a TVH headspace reading was measured. Headspace samples were used to evaluate the relative concentrations of hydrocarbons in the soil samples and aid in laboratory sample selection. A summary of the soil headspace screening results is presented on the individual boring logs presented in Appendix B. A Parsons ES geologist performed lithologic descriptions of the soil samples in the field. Soil types were classified according to the Unified Soil Classification System (USCS) and described in accordance with the standard Parsons ES soil description format. The geologic borehole logs are presented in Appendix B.

Soil samples selected for laboratory analysis were labeled with the site name and borehole number, sample depth, date of collection, and other pertinent data. Sample containers were then packaged to prevent breakage and were placed in an insulated shipping container packed with ice. Samples for laboratory analysis were shipped under standard chain-of-custody procedures to ITS in Richardson, Texas.

At the completion of each borehole, clean soil cuttings were used to backfill the borehole to the ground surface. The cuttings were compacted every few feet to prevent future settling.

3.1.3 Field and Laboratory Data Quality Assurance/Quality Control

Samples were collected, preserved, transported, and analyzed in such a manner that sampling results yield information that provides a reliable representation of the soil and groundwater quality at the site. To meet this requirement, the procedures described in Section 4 of the SAP (Appendix A) were followed during sample collection, handling, and analysis. In addition, laboratory QC samples were prepared and analyzed. These

procedures met or exceeded the minimum QA/QC requirements presented in the ADEM (1995) UST guidance manual.

3.1.4 Soil Analysis

All samples were analyzed by ITS of Richardson, Texas. The sample analytical methods and practical quantitation limits (PQLs) used during this effort are presented in Table 4.1 of the SAP (Appendix A). All soil samples were analyzed by United States Environmental Protection Agency (USEPA) Method SW8020 for BTEX, by USEPA Method SW8310 for PAHs, by USEPA Method SW7421 for lead, and by USEPA Method SW8015 modified for diesel- and gasoline-range TPH, TEH, and TVH, respectively.

3.2 GROUNDWATER SAMPLING PROCEDURES

Groundwater samples were collected from six existing groundwater monitoring wells at Site ST-001 to determine the concentration and extent of dissolved petroleum hydrocarbon contamination and to determine any changes compared to previous sampling events. Groundwater sampling locations are shown on Figure 2.2. Geochemical data relevant to documenting the potential for biodegradation of dissolved contaminants and quantitatively investigating environmental fate and transport also were collected. Groundwater samples were collected using the procedures described in the draft final confirmation SAP (Appendix A). Investigation activities included water level measurements, well purging and sampling, and field and fixed-base analytical measurements.

Two types of groundwater sampling and analysis were performed at Site ST-001 to evaluate natural attenuation processes in accordance with the draft AFCEE *Technical Protocol for Implementing the Intrinsic Remediation (Natural Attenuation) with Long-Term Monitoring Option for Dissolved Fuel Contamination in Groundwater* (Wiedemeier *et al.*, 1995), prepared by Parsons ES and the USEPA's Subsurface Protection and Remediation Division. Six wells were sampled and analyzed in the field for geochemical parameters relevant to documenting contaminant biodegradation. The same six wells also were sampled for chemical-specific analysis using fixed-base methods. Each of these activities is described briefly in the following sections. The sample analytical methods and PQLs used during this effort are presented in Table 4.1 of the SAP (Appendix A).

3.2.1 Field Screening and Analysis

Because the pH, temperature, conductivity, and other geochemical parameters of groundwater will change during shipment to a fixed laboratory, field measurements were employed. Field parameter values were determined from "fresh" water samples collected by the same means as those submitted for fixed-base analysis. Samples were collected and analyzed in the field by Parsons ES personnel on 9 and 10 July 1997.

Results of field sampling and screening are summarized in Section 4 and were used to characterize the nature and extent of groundwater contamination at Site ST-001. Field screening results also are used in Section 5 to assess the potential effects of

natural physical, chemical, and biological processes on contaminant concentrations, mass, form, persistence, and mobility.

3.2.2 Analytical Sampling

Groundwater samples for laboratory analysis were collected at six existing wells. The complete list of analytical methods used to evaluate groundwater samples is presented in Table 4.1 of the SAP (Appendix A). All groundwater samples were analyzed by USEPA Method SW8260 for VOCs, by USEPA Method SW8310 for PAHs, by USEPA Method SW7421 for lead, and by USEPA Method SW8015 modified for diesel- and gasoline-range TPH (TEH and TVH, respectively). QA/QC samples also were collected and analyzed in accordance with Section 4 of the SAP (Appendix A).

Analytical data are summarized in Section 4 and used to characterize the nature and extent of groundwater contamination at Site ST-001. Analytical results also are used in Section 5 to assess the potential effects of natural physical, chemical, and biological processes on contaminant concentrations, mass, form, persistence, and mobility. All groundwater sampling results are presented in Appendix E.

3.2.3 Well Purging, Sample Collection, and Decontamination

This section describes the procedures used for collecting groundwater samples at each of six existing groundwater monitoring wells. All water samples collected from groundwater monitoring were obtained using a peristaltic pump, fitted with new tubing for each well sampled. In order to maintain a high degree of QC during this sampling event, the procedures described in the following sections were followed.

3.2.3.1 Equipment Decontamination

Because new, disposable tubing was used for well purging and sample extraction, the water-level probe and cable was the only other piece of sampling equipment contacting the samples and the only piece of equipment requiring decontamination. Decontamination procedures are described in the SAP.

3.2.3.2 Well Purging

Prior to removing any water from the well, the static water level was measured. An electrical water level probe was used to measure the depth to groundwater below the well datum (to the nearest 0.01 foot). After measuring the static water level, the water level probe was lowered slowly to the bottom of the well, and the total well depth was measured to the nearest 0.01 foot. Based on these measurements, the volume of water in the well was calculated to determine the required purge volume. The pH, temperature, and specific conductivity were monitored before, during, and after well purging and recorded on well sampling forms. Each well was purged until a minimum of three casing volumes of water was removed and the pH, temperature, and specific conductivity stabilized to within 10 percent of previous readings. Wells were purged at a rate of approximately 0.5 liters per minute. Purge water was discharged onto the ground surface adjacent to the well from which it was removed.

3.2.3.3 Sample Extraction

A peristaltic pump with disposable tubing were used to extract groundwater samples from the well. The extraction equipment was lowered into the water gently to prevent splashing, and well water was extracted slowly to minimize volatilization of contaminants. Groundwater was extracted from the wells at a rate of approximately 0.01 liters per minute while filling the 40 ml volatile organic analysis (VOA) vials and at a rate of approximately 0.5 liters per minute while filling all other sample containers. Samples were transferred directly to the appropriate sample container. The water was carefully poured down the inner walls of the sample bottle to minimize aeration of the sample.

3.2.4 Onsite Chemical Parameter Measurement

Many of the groundwater chemical parameters listed in Table 4.1 of the SAP (Appendix A) were measured onsite by Parsons ES personnel. Temperature, pH, and specific conductivity measurements were made using direct-reading meters as described above, while others parameters were measured using a Hach® portable colorimeter in accordance with specific Hach® analytical procedures. These procedures are described in Section 4 of the SAP (Appendix A).

SECTION 4

CONFIRMATION SAMPLING RESULTS

This section summarizes the analytical results from confirmation soil and groundwater sampling activities. This section also identifies the ADEM ISLs and Tier 1 RBSLs and compares the soil and groundwater analytical results to these RBSLs.

4.1 LABORATORY SOIL RESULTS

Borehole logs from the confirmatory soil sampling activities are included in Appendix B, and complete soil analytical results from ITS are presented in Appendix E. Soil analytical results are summarized in Table 4.1.

Soil sample analysis indicates the highest levels of detected organic compounds at SB05 from 22 to 24 feet bgs. BTEX constituents were detected at levels of 1J (where J indicates a laboratory concentration below the PQL), 2J, and 28 mg/kg of benzene, toluene, and xylenes, respectively. The only other detections of BTEX constituents were at SB06, SB07, and SB08 at estimated concentrations of 0.001 mg/kg for both benzene and xylenes. Toluene was detected only at SB05, and ethylbenzene was not detected in any of the analyzed samples. These results indicate that the potential source for groundwater contamination by partitioning of BTEX from soil to groundwater has essentially been eliminated by bioventing treatment of site soils.

TVH and TEH were reported at their maximum concentrations of 851 and 292 mg/kg, respectively, at SB05. PAHs were only detected at SB03 and SB05, with the maximum concentrations reported from SB05 at a depth of 22 to 24 feet bgs. The maximum concentration of any PAH compound detected was for fluoranthene (2.1 mg/kg) in the sample from SB05 at a depth of 22 to 24 feet bgs. Naphthalene was not detected in any of the soil samples. Lead was detected in samples from all locations, and concentrations ranged from 0.6 mg/kg (SB07 at 20 to 22 feet bgs) to 20.0 mg/kg (SB04 at 10 to 12 feet bgs).

A comparison of analytical results for soil samples collected prior to and following approximately 22 months of bioventing system operation indicates an overall reduction of BTEX and total hydrocarbon concentrations. Table 4.2 presents the BTEX and total hydrocarbon results for several pairs of soil samples collected before and after bioventing treatment. Although pre-bioventing soil samples were analyzed for TRPH and post-bioventing samples were analyzed for TVH and TEH, a comparison of TRPH to TVH plus TEH provides a rough indication of contaminant reduction. Samples from each pair were collected in close proximity to each other and were collected from the same or similar depth intervals. Concentrations of toluene, ethylbenzene, and xylenes

TABLE 4.1
CONFIRMATORY SOIL SAMPLE ANALYTICAL RESULTS
SITE ST-001, GUNTER ANNEX
MAXWELL AFB, ALABAMA

Sampling Location	SB01	SB02	SB03	SB03	SB03	SB04
Depth Sampled (feet)	9-11	15-17	20-22	15-17	20-22	10-12
Date Sampled	7/8/97	7/8/97	7/8/97	7/8/97	7/8/97	7/8/97
Units	(mg/kg) ^{a/}	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Method SW8020						
Benzene	<0.001 ^{b/}	<0.001	<0.001	<0.001	<0.001	<0.006
Toluene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.012
Ethylbenzene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.012
Xylenes	<0.002	<0.002	<0.002	<0.002	<0.002	<0.012
Method SW8015 Modified						
TVH ^{d/}	<1.18	<1.10	<1.07	<1.12	<1.05	443J ^{d/}
TEH ^{d/}	7.6J	7.0J	6.0J	6.1J	8.1J	106
Method SW7421						
Lead	16.0	5.9	2.5	3.7	1.7	3.0
Method SW8310						
Acenaphthene	<1.42	<1.33	<1.28	<1.35	<1.26	<1.30
Acenaphthylene	<1.82	<1.70	<1.65	<1.73	<1.62	<1.67
Anthracene	<0.521	<0.486	<0.470	<0.493	<0.464	<0.477
Benzo(a)anthracene	<0.0107	<0.0099	<0.0096	<0.0101	<0.0095	0.0358
Benzo(a)pyrene	<0.0178	<0.0166	<0.0160	<0.0168	<0.0158	0.0195
Benzo(b)fluoranthene	<0.0142	<0.0133	<0.0128	<0.0135	<0.0126	<0.0130
Benzo(ghi)perylene	<0.0592	<0.0553	<0.0534	<0.0561	<0.0527	<0.0542
Benzo(k)fluoranthene	<0.0130	<0.0122	<0.0118	<0.0123	<0.0116	<0.0119
Chrysene	<0.118	<0.111	<0.107	<0.112	<0.105	<0.124
Dibenzo(a,h)anthracene	<0.0237	<0.0221	<0.0214	<0.0224	<0.0211	<0.0217
Fluoranthene	<0.166	<0.155	<0.150	<0.157	<0.148	0.177
Fluorene	<0.166	<0.155	<0.150	<0.157	<0.148	<0.152
Indeno(1,2,3-c,d)pyrene	<0.0355	<0.0332	<0.0320	<0.0336	<0.0316	<0.0325
Naphthalene	<1.42	<1.33	<1.28	<1.35	<1.26	<0.130
Phenanthrene	<0.498	<0.464	<0.449	<0.471	<0.443	<0.456
Pyrene	<0.213	<0.199	<0.192	<0.202	<0.190	<0.195

TABLE 4.1 (Continued)
CONFIRMATORY SOIL SAMPLE ANALYTICAL RESULTS
 SITE ST-001, GUNTER ANNEX
 MAXWELL AFB, ALABAMA

Sampling Location	SB05	SB06	SB07	SB08	SB08
Depth Sampled (feet)	15-17	15-17	10-12	20-22	20-22
Date Sampled	7/8/97	7/8/97	7/8/97	7/8/97	7/8/97
Units	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Method SW8020					
Benzene	< 0.001	0.001 J	< 0.001	0.001 J	< 0.001
Toluene	< 0.002	< 0.002	< 0.002	< 0.002	< 0.003
Ethylbenzene	< 0.002	< 0.002	< 0.002	< 0.002	< 0.003
Xylenes	< 0.002	< 0.002	< 0.002	0.001 J	< 0.003
Method SW8015 Modified					
TVH	< 1.05	0.273 J	< 1.18	< 1.15	< 1.32
TEH	7.7 J	8.8 J	7.2 J	6.5 J	6.4 J
Method SW7421					
Lead	3.0	4.8	9.0	0.6	5.0
Method SW8310					
Acenaphthene	< 1.26	< 1.36	< 1.42	< 1.27	< 1.58
Acenaphthylene	< 1.62	< 1.75	< 1.82	< 1.63	< 2.03
Anthracene	< 0.463	< 0.499	< 0.519	< 0.467	< 0.579
Benzo(a)anthracene	< 0.0095	< 0.0102	< 0.0106	< 0.0095	< 0.0118
Benzo(a)pyrene	< 0.0158	< 0.0170	< 0.0177	< 0.0159	< 0.0197
Benzo(b)fluoranthene	< 0.0126	< 0.0136	< 0.0142	< 0.0127	< 0.0158
Benzo(ghi)perylene	< 0.0526	< 0.0567	< 0.0590	< 0.0530	< 0.0658
Benzo(k)fluoranthene	< 0.0116	< 0.0125	< 0.0136	< 0.0117	< 0.0145
Chrysene	< 0.105	< 0.113	< 0.118	< 0.106	< 0.132
Dibenzo(a,h)anthracene	< 0.0211	< 0.0227	< 0.0236	< 0.0212	< 0.0263
Fluoranthene	< 0.147	< 0.159	< 0.165	< 0.148	< 0.184
Fluorene	< 0.147	< 0.159	< 0.165	< 0.148	< 0.184
Indeno(1,2,3-c,d)pyrene	< 0.0316	< 0.0340	< 0.0354	< 0.0318	< 0.0395
Naphthalene	< 1.26	< 1.36	< 1.42	< 1.38	< 1.58
Phenanthrene	< 0.442	< 0.476	< 0.495	< 0.484	< 0.553
Pyrene	< 0.189	< 0.204	< 0.212	< 0.191	< 0.237

^a mg/kg = milligrams per kilogram.

^b < = compound analyzed for, but not detected. Number shown represents the method detection limit (MDL).

^c TVH = total volatile hydrocarbons; gasoline range.

^d TEH = total extractable hydrocarbons; diesel range.

^e J = Compound detected above MDL and less than practical quantitation limit (PQL). Reported concentration is a laboratory estimate.

^f Shading indicates maximum concentration detected.

TABLE 4.2
COMPARISON OF PRE- AND POST-BIOVENTING SOIL ANALYTICAL RESULTS
SITE ST-001, GUNTER ANNEX
MAXWELL AFB, ALABAMA

Sample number	Sample Depth (feet bgs) ^{a/}	Date Sampled ^{b/}	Units	Analytes						
				Benzene	Toluene	Ethyl-benzene	Total Xylenes	TVH ^{c/}	TEH ^{d/}	TRPH ^{e/}
GMW-2	10-11.5	1991	(mg/kg) ^{f/}	--- ^{g/}	---	---	---	---	---	633
	20-21.5	1991	(mg/kg)	---	---	---	---	---	---	1,117
SB01	9-11	July 97	(mg/kg)	< 0.001 ^{h/}	< 0.002	< 0.002	< 0.002	< 1.18	7.6 J ^{i/}	---
	19-21	July 97	(mg/kg)	< 0.001	< 0.002	< 0.002	< 0.002	< 1.07	6.8 J	---
GMW-1	10-11.5	1991	(mg/kg)	---	---	---	---	---	---	59
	20-21.5	1991	(mg/kg)	---	---	---	---	---	---	95
SB7	10-12	July 97	(mg/kg)	< 0.001	< 0.002	< 0.002	< 0.002	< 1.18	7.2 J	---
	20-22	July 97	(mg/kg)	< 0.001	< 0.002	< 0.002	0.001 J	< 1.06	4.1 J	---
GMW-4	10-11.5	1991	(mg/kg)	---	---	---	---	---	---	BDL ^{j/}
	20-21.5	1991	(mg/kg)	---	---	---	---	---	---	86
SB08	15-17	July 97	(mg/kg)	0.001 J	< 0.002	< 0.002	0.001 J	< 1.15	6.5 J	---
	20-22	July 97	(mg/kg)	< 0.001	< 0.003	< 0.003	< 0.003	< 1.32	6.4 J	---
VW	15-17	Sept. 95	(mg/kg)	< 0.053	0.38	0.89	7.50	---	---	120
	20-22	Sept. 95	(mg/kg)	< 0.055	< 0.055	1.00	5.90	---	---	6.9
SB02	15-17	July 97	(mg/kg)	< 0.001	< 0.002	< 0.002	< 0.002	< 1.10	7.0 J	---
	20-22	July 97	(mg/kg)	< 0.001	< 0.002	< 0.002	< 0.002	< 1.07	6.0 J	---

^{a/} feet bgs = feet below ground surface.

^{b/} 1991 - pre-bioventing soil sampling by U.S Army Corps of Engineers (1992). Sept. 1995 - soil samples collected during installation of bioventing system (Parsons ES, 1995). July 1997 - confirmation soil sampling by Parsons ES.

^{c/} TVH= total volatile hydrocarbons.

^{d/} TEH= total extractable hydrocarbons.

^{e/} TRPH = Total recoverable petroleum hydrocarbons.

^{f/} mg/kg = milligrams per kilogram.

^{g/} --- = not analyzed.

^{h/} < = compound analyzed for but not detected above the practical quantitation limit (PQL).

^{i/} J= Compound detected above MDL and less than practical quantitation limit (PQL).

Number shown represents the laboratory reporting limit (RL).

^{j/} BDL = below detection limit.

measured in samples from SB02 (collected July 1997) prior to bioventing treatment were significantly lower than concentrations measured in samples from the VW borehole (collected September 1995) prior to bioventing treatment. Total petroleum hydrocarbon concentrations were reduced from concentrations between 6.9 and 1,117 mg/kg before bioventing treatment to very low (estimated) or non-detectable concentrations following treatment. The overall reduction in soil fuel hydrocarbon concentrations presented in Table 4.2 indicates that operation of the bioventing system effectively reduced residual fuel hydrocarbon concentrations in site soils.

4.2 LABORATORY GROUNDWATER RESULTS

4.2.1 1997 Confirmation Sampling Results

Complete groundwater analytical results from ITS for the 1997 sampling event are presented in Appendix E, and the results are summarized in Table 4.3. Six groundwater samples were collected at Site ST-001 and submitted for laboratory analysis of VOCs (including BTEX), PAH, TEH, TVH, and total lead. Additionally, all samples were analyzed for sulfate, and samples from wells GMW-4 and GMW-5 were analyzed for methane. Sulfate and methane results are discussed in Section 5. Free-phase product was not detected in any of the six wells sampled.

BTEX and trimethylbenzenes (TMBs) were the only VOCs detected above the respective PQLs. These VOCs were detected in samples from wells GMW-4 and GMW-44, with the highest concentrations detected in samples from well GMW-4. Groundwater analysis of samples from GMW-4 detected 13.4 micrograms per liter ($\mu\text{g/L}$) benzene, 2,450 $\mu\text{g/L}$ toluene, 1,730 $\mu\text{g/L}$ ethylbenzene, 8,340 $\mu\text{g/L}$ xylenes, 508 $\mu\text{g/L}$ 1,3,5 TMB, and 1,380 $\mu\text{g/L}$ 1,2,4 TMB. No chlorinated VOCs were detected above the PQLs listed in Appendix A, Table 4.1. Naphthalene, the only detected PAH compound, was detected in samples from GMW-4 and GMW-44, with a maximum concentration of 624 $\mu\text{g/L}$ (GMW-4). Detections of lead ranged from 1.7 $\mu\text{g/L}$ (GMW-1) to 7.1 $\mu\text{g/L}$ (GMW-45). Maximum concentrations of TVH and TEH were detected in the sample from GMW-4 at 8.93 milligrams per liter (mg/L) and 7.50 mg/L, respectively.

In December 1997, through an internal audit, ITS discovered that inappropriate manual integrations of chromatographic peak areas were being performed by the gas chromatography/mass spectrometry (GC/MS) department in the Richardson, Texas facility. The affected analysis was USEPA Method SW8260. The groundwater analytical data for VOCs from the July 1997 sampling event is potentially affected by this issue. Because of the accuracy of the July 1997 groundwater analytical data obtained using USEPA Method SW8260 is in question, Parsons ES has obtained groundwater analytical data from two subsequent sampling events performed by base contractors in 1998 to support the case for site closure.

4.2.2 1998 Sampling Results

After the July 1997 confirmation groundwater sampling was completed by Parsons ES, two additional groundwater sampling events were performed in 1998 (Environmental Solutions and Technologies, 1998; Environmental-Materials

TABLE 4.3
1997 GROUNDWATER ANALYTICAL RESULTS
SITE ST-001, GUNTER ANNEX
MAXWELL AFB, ALABAMA

Sample Location Date Sampled	Units	GMW-1 7/8/97	GMW-2 7/8/97	GMW-3 7/8/97	GMW-4 7/8/97	GMW-44 7/8/97	GMW-45 7/8/97
Method SW8260							
Benzene	µg/L ^{a/}	< 5.00 ^{b/}	< 5.00	< 5.00	13.4	7.44	< 5.00
Toluene	µg/L	< 5.00	< 5.00	< 5.00	2450	68.8	< 5.00
Ethylbenzene	µg/L	< 5.00	< 5.00	< 5.00	1730	251	< 5.00
Xylenes	µg/L	< 5.00	< 5.00	< 5.00	8340	839	< 5.00
1, 3, 5-Trimethylbenzene	µg/L	< 5.00	< 5.00	< 5.00	508	120	< 5.00
1, 2, 4-Trimethylbenzene	µg/L	< 5.00	< 5.00	< 5.00	1380	328	< 5.00
Method SW8015M							
TVH ^{c/}	mg/L ^{d/}	< 0.100	< 0.100	0.0456 J ^{e/}	8.93	4.64	0.0172 J
TEH ^{f/}	mg/L	0.053	< 1.00	0.097 J	7.5	1.47	0.063 J
Method SW7421							
Lead	mg/L	0.0017 J	< 0.0020	< 0.0020	0.0069	< 0.0020	0.0071
Method SW8310							
Naphthalene	µg/L	< 18.0	< 18.0	< 18.0	624	56.2	< 30.6

NOTE: Groundwater analytical data was provided by Intertek Testing Services (ITS) of Richardson, Texas. ITS has disclosed that inappropriate manual peak area integration has occurred in this lab, and the SW8260 results are potentially impacted.

^{a/} µg/L = micrograms per liter.

^{b/} < = compound analyzed for but not detected. Number shown represents the method detection limit (MDL).

^{c/} TVH = total volatile hydrocarbons; gasoline range.

^{d/} mg/L = milligrams per liter.

^{e/} J = Compound detected above MDL and less than practical quantitation limit (PQL).

Reported concentration is a laboratory estimate.

^{f/} TEH = total extractable hydrocarbons; diesel range.

Consultants, 1998). The February 1998 sampling event was performed by Environmental Solutions and Technologies using Method 602, and samples were analyzed by VOC Analytical Laboratories of Boca Raton, Florida. The August 1998 sampling event was performed by Environmental-Materials Consultants using Method 602, and the samples were analyzed by Sutherland Environmental Testing Laboratory of Birmingham, Alabama. Results of the 1998 and previous groundwater sampling events are presented in Table 4.4. During 1998, toluene, ethylbenzene, and xylenes were detected in samples from three wells (GMW-3, GMW-4, and GMW-44) and benzene in two wells (GMW-3 and GMW-44). Methyl tertiary butyl ether (MTBE) was analyzed for but not detected in any samples. The maximum concentrations of toluene (1,400 µg/L), ethylbenzene (1,200 µg/L), and xylenes (5,900 µg/L) were detected in the sample from well GMW-4 collected in February 1998. Benzene was detected at a maximum concentration of 2 µg/L in the sample from well GMW-3 collected in August 1998.

The results presented in Table 4.4 indicate that BTEX concentrations are steadily decreasing with time. Figure 4.1 graphically presents the decreases in toluene, ethylbenzene, toluenes and total BTEX that have occurred for July 1996 to August 1998 at well GMW-4. A more complete discussion on decreasing BTEX concentrations is included in Section 5.

4.3 STATE SOIL AND GROUNDWATER CLEANUP STANDARDS

This subsection discusses site cleanup requirements based on the new ARBCA guidelines that were put into effect in April 1998 (ADEM, 1998). Because the ARBCA guidelines were implemented following preparation of the SAP and sample collection, this discussion supercedes Section 3 (Site Cleanup Requirements) of the SAP (Appendix A).

ADEM has adopted a tiered, risk-based approach to the remediation of petroleum-hydrocarbon contaminated sites (ADEM, 1998) that is similar to the American Society for Testing and Materials (ASTM, 1995) risk-based corrective action (RBCA) process and is supported by the USEPA. This approach allows for the establishment of site-specific corrective action requirements based on an analysis of potential receptor exposures to chemical contamination at or migrating from the release site. Under the RBCA paradigm, both generic cleanup criteria (developed by ADEM) and site-specific chemical fate and exposure data can be used to evaluate the risk associated with site contamination.

The first level of evaluation in ADEM's (1998) approach, a Tier 1 or screening-level assessment, involves comparing contaminant concentrations measured in site media to ADEM-defined, nonsite-specific generic screening levels. This is a two-step process where contaminant concentrations are first compared to non-pathway specific ISLs for residential and commercial scenarios. If no compounds exceed the ISLs, then no further action (NFA) is required. In the second step, any compound concentrations exceeding the ISLs are compared to generic RBSLs that are dependent on potential exposure pathways. The generic cleanup criteria are based on conservative exposure assumptions and vary depending on current and foreseeable land use scenarios. ADEM (1998) has defined generic RBSLs for four categories of potential human receptors (a

TABLE 4.4
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
SITE ST-001, GUNTER ANNEX
MAXWELL AFB, ALABAMA

Sample Location	Sample Date/Source ^a	Analytes ^b												
		Benzene (µg/L) ^c	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Total BTEX (µg/L)	Lead (µg/L)	1,2,4-TMB (µg/L)	1,3,5-TMB (µg/L)	cis-1,2-DCE (µg/L)	TCE (µg/L)	Naphthalene (µg/L)	1-Methyl-naphthalene (µg/L)	2-Methyl-naphthalene (µg/L)
GMW-1	(1991) USACE	5.1	ND ^d	2.2	2.5	9.8	40	ND ^e	ND	ND	ND	ND	ND	ND
	(7/14/94) BE	<1 ^f	<4	<1	<1	ND	ND	<1	<1	<1	<2	<2	<2	<2
	(7/25/96) WE	<1	<1	<1	<1	ND	ND	<5.0	<5.0	<5.0	<18.0	ND	ND	ND
	(7/10/97) PES	<5.0	<5.0	<5.0	<5.0	ND	1.7	<5.0	<5.0	<5.0	<5.0	<18.0	ND	ND
	(2/27/98) EST	<5.0	<5.0	<5.0	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
GMW-2	(8/5/98) EMC	<5.0	<5.0	<5.0	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
	(1991) USACE	1.7	ND	ND	ND	1.7	5	ND	ND	ND	ND	ND	ND	ND
	(7/25/96) WE	<1	<1	<1	<1	ND	ND	<1	<1	<1	<2	<2	<2	<2
	(7/10/97) PES	<5.0	<5.0	<5.0	<5.0	ND	<2.0	<5.0	<5.0	<5.0	<18.0	ND	ND	ND
	(2/27/98) EST	<5.0	<5.0	<5.0	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
GMW-3	(8/5/98) EMC	<5.0	<5.0	<5.0	<5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
	(1991) USACE	33	39	31	120	223	78	ND	ND	ND	ND	ND	ND	ND
	(7/25/96) WE	1.1	<1	<1	3	4.1	ND	ND	<5.0	<5.0	<18.0	ND	ND	ND
	(7/10/97) PES	<5.0	<5.0	<5.0	<5.0	ND	<2.0	<5.0	<5.0	<5.0	<18.0	ND	ND	ND
	(8/5/98) EMC	2	3	3	8	16	ND	ND	ND	ND	ND	ND	ND	ND
GMW-4	(1991) USACE	290	3,300	240	5,200	9,030	43	ND	ND	ND	ND	ND	ND	ND
	(7/25/96) WE	<500	7,210	1,820	8,020	17,050	ND	ND	ND	ND	ND	ND	ND	ND
	(7/10/97) PES	13.4	2,450	1,730	8,340	12,533	6.9	1,380	508	<5.0	<5.0	624	19	39
	(2/27/98) EST	<5	1,400	1,200	5,900	8,500	ND	ND	ND	ND	ND	ND	ND	ND
	(8/5/98) EMC	<5	840	920	4,020	5,780	ND	ND	ND	ND	ND	ND	ND	ND
GMW-42	(1994) Radian	ND	ND	ND	ND	ND	1.3 ^g	ND	ND	ND	ND	ND	ND	ND
GMW-43	(1994) Radian	ND	ND	ND	ND	ND	1.0 ^h	ND	ND	ND	ND	ND	ND	ND
GMW-44	(1994) Radian	43	7	12	25	87	ND	ND	ND	ND	ND	ND	ND	ND
	(7/25/96) WE	37.3	189	152	423	801	ND	ND	ND	ND	ND	ND	ND	ND
	(7/10/97) PES	7.44	68.8	251	839	1,166	<2.0	328	120	<5.0	<5.0	56.2	ND	ND
	(2/27/98) EST	<5	11	92	470	573	ND	ND	ND	ND	ND	ND	ND	ND
	(8/5/98) EMC	1	1	8	14	24	ND	ND	ND	ND	ND	ND	ND	ND
GMW-45	(1994) Radian	ND	ND	ND	ND	ND	2.9 ^h	ND	ND	ND	ND	ND	ND	ND
	(7/14/94) BE	7.7	<4	12	37	57	ND	32	9.4	3.3	<2	<2	2.1	<2
	(7/25/96) WE	<1	<1	<1	<1	ND	ND	<5.0	<5.0	<5.0	<30.6	ND	ND	ND
	(7/10/97) PES	<5.0	<5.0	<5.0	<5.0	ND	7.1	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
	(8/5/98) EMC	<5.0	<5.0	<5.0	<5.0	ND	ND	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0

^a BTEX = benzene, toluene, ethylbenzene, and xylene; TMB = trimethylbenzene; DCE = dichloroethene; TCE = trichloroethene.

^b USACE - U.S. Army Corps of Engineers (USACE, 1992); BE - Benchmark Engineering (1994); WE - Williams Engineering, Inc. (1996); Radian - Radian Corporation (1994); PES - Parsons Engineering Science, Inc. (1997 confirmation sampling); EST - Environmental Solutions and Technologies (1998); EMC - Environmental Materials Consulting, Inc. (1998).

^c µg/L = micrograms per liter.

^d ND = not detected; method detection limit not available.

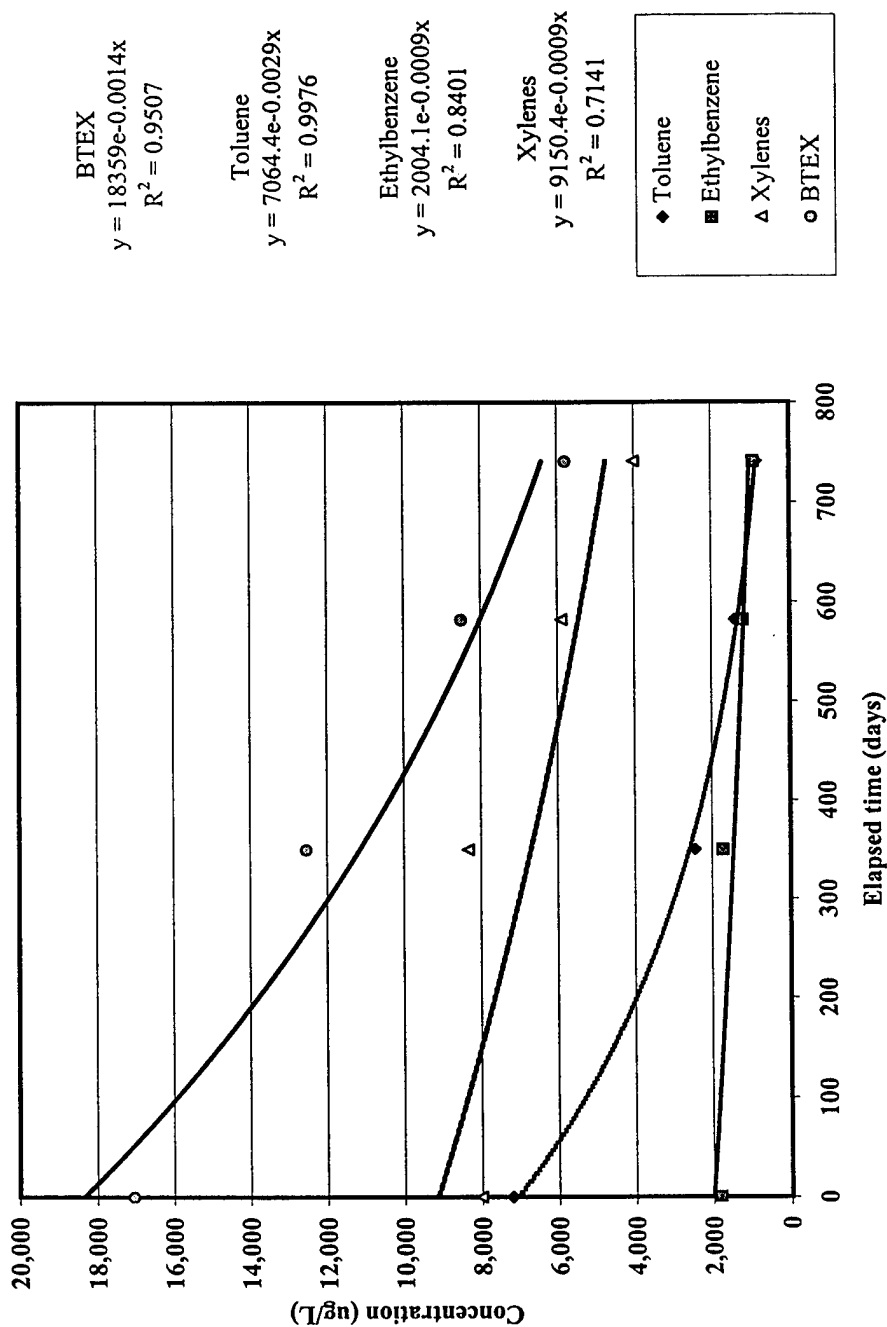
^e --- = not analyzed.

^f < = analyte concentration is less than the laboratory reporting limit shown.

^g Analyte detected in method blank.

FIGURE 4.1
BTEX CONCENTRATIONS VS. TIME
WELL GMW-4
SITE ST-001, GUNTER ANNEX
MAXWELL AFB, ALABAMA

WELL GMW-4



resident child, resident adult, commercial worker, and construction worker); for surface water protection; and for soil concentrations that are protective of groundwater. These criteria were developed by ADEM using standardized algorithms designed to be health protective of potential human and ecological receptors under various exposure scenarios.

In the event that contaminant concentrations exceed Tier 1 RBSLs in some samples, ADEM allows an area-weighted average concentration to be calculated. The area-weighted average concentration can be determined using the Thiessen Polygon Method, as described in Appendix B of the ARBCA Guidelines (ADEM, 1998). If the area-weighted average concentration does not exceed the Tier 1 RBSL, then NFA is required.

The generic cleanup criteria are used to identify which, if any, contaminants and environmental medium may warrant additional evaluation or remediation to protect human receptors. If measured site concentrations do not exceed the applicable generic cleanup criteria, no additional remedial action is necessary. However, institutional controls such as deed restrictions may be appropriate if commercial worker or construction worker cleanup criteria are used. In the event that measured site concentrations exceed the applicable generic cleanup criteria, additional corrective action, or a more comprehensive evaluation (i.e., Tier 2 and possibly Tier 3), must be pursued.

Tier 2 and Tier 3 evaluations are more comprehensive than a Tier 1 analysis because they require quantitative contaminant fate and transport calculations and development of site-specific cleanup criteria based on site-specific conditions. The Tier 2 and 3 evaluations are used to identify if any unacceptable exposures could occur at the site considering existing contaminant concentrations in site media, potentially completed exposure pathways, and possible receptor scenarios. Although Tier 2 and 3 evaluations usually involve a more rigorous analysis, they result in a more focused evaluation of those contaminants that actually pose a risk to potential receptors.

4.4 SOIL AND GROUNDWATER CLEANUP CRITERIA FOR SITE ST-001

4.4.1 Land Use and Potential Receptors

Gunter Annex is an active facility and is not scheduled for closure. Site ST-001 is currently vacant, and land uses adjacent to the site are commercial and residential (Figure 2.1). Base housing (Buildings 406, 427, and 428) is located north and east (crossgradient and upgradient, respectively) of Site ST-001. Vacant land and office buildings (Building 502, 505, and 325) are located south and west (crossgradient and downgradient, respectively) of the site. Future land use for Site ST-001 has not been established. For purposes of discussion and comparison, residential land use scenarios are discussed below as a very conservative projection of future site use.

Based on these land use assumptions and the site description presented in Section 2, current downgradient office workers (Building 325), crossgradient base housing residents (Building 406), and onsite workers are the primary human receptor populations. Because of the developed nature of the site and surrounding areas,

ecological receptors are not likely to be exposed to contaminants in site media under current or anticipated future land uses.

Currently there is no on-Base beneficial use of groundwater from the shallow aquifer. Gunter Annex obtains its drinking water from the local municipality. As a result, exposure of onsite and off-site human receptors to site contaminants through ingestion of, inhalation of, or dermal contact with contaminants in groundwater extracted for potable use is unlikely under current and expected land use scenarios.

Confirmatory field and laboratory soil sample results indicate that residual soil contamination occurs only within soils located at depths greater than 20 feet bgs (Table 4.1 and Appendix B). Therefore, exposure of onsite human receptors to site contaminants through ingestion of, or dermal contact with, contaminants in soil is unlikely.

Based on this information, the most potentially significant contaminant migration pathways resulting from contamination at Site ST-001 are the leaching of residual contaminants from soil to groundwater, and the volatilization of contaminants from soil and/or groundwater into soil vapors, which could migrate to the surface or into structures. The most potentially significant potential receptor exposure route resulting from residual contamination at Site ST-001 is inhalation of fuel hydrocarbon vapors that may migrate into existing offsite structures or future onsite structures.

4.4.2 Sampling Results Compared to Tier 1 Initial Screening Levels

Based on the land use assumptions described in the previous section, the generic ARBCA ISLs for unsaturated soil and groundwater at Site ST-001 are the criteria for commercial and residential land uses (ADEM, 1998). Site contaminant concentrations measured in soil and groundwater (maximum concentrations), as determined during the 1997 soil sampling event and the 1998 groundwater sampling events, are presented in Tables 4.5 and 4.6 along with ARBCA ISLs.

4.4.2.1 Soil Results

Site contaminant concentrations measured in soil (maximum concentration) during the 1997 soil sampling event are presented in Table 4.5 along with the appropriate generic ADEM ISLs. As shown on Table 4.5, the only contaminants detected in site soils at concentrations exceeding their respective Tier 1 ISLs were benzene and total xylenes. Benzene was detected at a maximum estimated concentration of 11 mg/kg, which exceeded both the residential ISL of 0.0969 mg/kg and the commercial ISL of 0.104 mg/kg. Total xylenes were detected at maximum concentrations of 28 mg/kg, which exceeded the residential ISL of 13.1 mg/kg (the commercial ISL of 141 mg/kg was not exceeded). Because the ISLs for benzene and total xylenes were exceeded, soil results for benzene and total xylenes were compared to the Tier 1 RBSLs to determine whether or not they pose an unacceptable risk to human health (see Section 4.4.3).

TABLE 4.5
COMPARISON OF SOIL CONCENTRATIONS TO
ARBCA INITIAL SCREENING LEVELS
 SITE ST-001, GUNTER ANNEX
 MAXWELL AFB, ALABAMA

		ARBCA Initial Screening Levels ^{a/}		Maximum Confirmation	Does the Maximum Concentration
	Units	Residential	Commercial	Sampling Result	Exceed Either Criterion?
Organics					
Benzene	mg/kg ^{b/}	0.0969	0.104	1 J ^{c/}	Yes
Toluene	mg/kg	9.15	32.9	2 J	No
Ethylbenzene	mg/kg	199	209	< 2 ^{d/}	No
Xylenes	mg/kg	13.1	141	28	Yes
Acenaphthene	mg/kg	NA ^{e/}	NA	< 1.58	NA
Acenaphthylene	mg/kg	NA	NA	< 2.03	NA
Anthracene	mg/kg	10.2	10.2	< 0.583	No
Benzo(a)anthracene	mg/kg	9.51	22.4	0.455	No
Benzo(a)pyrene	mg/kg	0.952	2.24	0.364	No
Benzo(b)fluoranthene	mg/kg	9.5	18.5	0.318	No
Benzo(k)fluoranthene	mg/kg	9.52	9.84	0.141	No
Benzo(ghi)perylene	mg/kg	11.1	11.1	0.206	No
Chrysene	mg/kg	6.37	6.37	0.382	No
Dibenzo(a,h)anthracene	mg/kg	NA	NA	0.024	NA
Fluoranthene	mg/kg	101	101	2.09	No
Fluorene	mg/kg	153	153	< 0.184	No
Naphthalene	mg/kg	5.94	5.94	< 1.58	No
Phenanthrene	mg/kg	141	141	< 0.553	No
Ideno(1, 2, 3-c, d)pyrene	mg/kg	NA	NA	0.184	NA
Pyrene	mg/kg	91.8	91.8	1.48	No
TVH ^{f/}	mg/kg	NA	NA	851J	NA
TEH ^{g/}	mg/kg	NA	NA	292	NA
Metals					
Lead	mg/kg	42	42	20	No

^{a/} Values shown represent non-exposure-pathway specific initial screening levels (ISLs) (ADEM, 1998).

^{b/} mg/kg = milligrams per kilogram.

^{c/} J = Compound detected above method detection limit and less than practical quantitation limit (PQL). Reported concentration is a laboratory estimate.

^{d/} < = analyte concentration less than laboratory reporting limit shown.

^{e/} NA - not applicable.

^{f/} TVH = Total volatile hydrocarbons.

^{g/} TEH = Total extractable hydrocarbons.

4.4.2.2 Groundwater Results

Maximum contaminant concentrations measured during the two most recent (1998) groundwater sampling events are presented in Table 4.6 along with the appropriate generic Tier 1 ISLs. Because the 1998 sampling events did not include PAH analyses, the maximum concentration of naphthalene detected in July 1997 groundwater sampling event is also presented in Table 4.6, along with the appropriate generic Tier 1 ISLs. Naphthalene was the only PAH compound detected during the July 1997 groundwater sampling event. As shown on Table 4.6, the only organic contaminants detected in site groundwater at concentrations exceeding their respective Tier 1 ISLs were toluene, ethylbenzene, and naphthalene. Maximum concentrations of toluene (1,400 µg/L), ethylbenzene (1,200 µg/L), and naphthalene (624 µg/L) exceeded their respective ISLs of 1,000 µg/L, 700 µg/L, and 20 µg/L. The ISLs for these three compounds are the same for both residential and commercial land use scenarios. The maximum detected concentration of lead (7.1 mg/L) exceeded the respective ISLs for both residential and commercial land use (0.015 mg/L). Because of these exceedances, toluene, ethylbenzene, naphthalene, and lead were retained for comparison to the Tier 1 risk-based screening levels to determine whether or not they pose an unacceptable risk to human health (Section 4.4.3).

4.4.3 Sampling Results Compared to Tier 1 Risk-Based Screening Levels

Based on the land use assumptions and potential exposure pathways previously described, the generic risk-based ARBCA criteria appropriate for Tier 1 screening of unsaturated soils and groundwater at Site ST-001 include the criteria for indoor and outdoor inhalation of vapors emissions. Because of the existing adjacent residential housing, and possible future residential housing at the site, the conservative assumption of inhalation of vapor emissions from soil and groundwater by a resident child receptor was assumed for selecting the appropriate risk-based screening levels for this site. (ADEM, 1998). Because the depth to residual soil contamination is greater than 17 feet bgs, and because there is no beneficial use of groundwater in the vicinity of the site, dermal contact with soil contaminants and ingestion of groundwater were eliminated as potential exposure pathways.

Maximum site contaminant concentrations measured in soil and groundwater during the 1997 soil sampling event and the 1997 and 1998 groundwater sampling events that exceeded ISLs are presented in Table 4.7 along with the appropriate ADEM risk-based screening levels. With the exception of benzene and total xylenes in soil, no contaminants measured in site soils or groundwater during the 1997 soil sampling event and 1998 groundwater sampling events exceeded their respective Tier 1 risk-based screening levels. As shown on Table 4.7, the maximum concentration of benzene detected in site soils in 1997 (a laboratory-estimated concentration of 1J mg/kg) exceeded the Tier 1 RBSL of 0.0969 mg/kg for the "indoor inhalation of vapor emissions" exposure scenario. However, the area-weighted average of benzene (calculated to be 0.06 mg/kg) is below the Tier 1 RBSLs for benzene. Calculations for the area-weighted average concentration of benzene are provided in Appendix C. Similarly, the maximum concentration of total xylenes detected in site soils in 1997 (28 mg/kg) exceeded the Tier 1 RBSL of 13.1 mg/kg for the "indoor inhalation of vapor emissions" exposure scenario as shown on Table 4.7. However the area-weighted

TABLE 4.6
COMPARISON OF 1998 GROUNDWATER CONCENTRATIONS TO
ARBCA INITIAL SCREENING LEVELS
SITE ST-001, GUNTER ANNEX
MAXWELL AFB, ALABAMA

Compound	Units	ARBCA Initial Screening Levels ^{a/}		Maximum Site Concentration ^{b/}	Does the Maximum Concentration Exceed Either Criterion?
		Residential	Commercial		
Organics					
Benzene	µg/L ^{c/}	5.0	5.0	<5 ^{d/}	No
Toluene	µg/L	1,000	1,000	1,400	Yes
Ethylbenzene	µg/L	700	700	1,200	Yes
Xylenes	µg/L	9,230	10,000	5,900	No
Naphthalene	µg/L	20	20	624	Yes
Metals					
Lead	mg/L ^{e/}	0.015	0.15	7.1	Yes

^{a/} Values shown represent non-exposure-pathway specific initial screening levels (ISLs) (ADEM, 1998).

^{b/} Maximum concentrations for BTEX and lead from 1998 groundwater sampling event (EMC, 1998; and EST, 1998).
Maximum concentration for naphthalene from 1997 groundwater sampling event by Parsons ES.

^{c/} µg/L = micrograms per liter.

^{d/} < = compound analyzed for but not detected above the practical quantitation limit (PQL).

^{e/} mg/L = milligrams per liter.

TABLE 4.7
SOIL AND GROUNDWATER CONCENTRATIONS COMPARED TO
ARBCA RISK-BASED SCREENING LEVELS FOR A RESIDENT CHILD
SITE ST-001, GUNTER ANNEX
MAXWELL AFB, ALABAMA

Compound	Units	ARBCA Tier 1 Risk-Based Screening Levels ^{a/}			Maximum Site Concentration	Max. Conc. Exceeds Either Criterion	Area-Weighted Average	Area-Weighted Concentration Exceeds Either Criterion
		Indoor Inhalation of Vapor Emissions	Outdoor Inhalation of Vapor Emissions	Vapor Intrusion				
SOIL								
Organics								
Benzene	mg/kg ^{b/}	0.0969	2.07		1J ^{c/}	Yes	0.06	No
Xylenes	mg/kg	13.1	280		28	Yes	1.39	No
GROUNDWATER								
Organics								
Toluene	mg/L ^{d/}	1.11E+01	5.35E+02		1.4E+00	No	----- ^{e/}	----
Ethylbenzene	mg/L	2.69E+01	1.52E+02		1.2E+00	No	----	----
Naphthalene	mg/L	2.13E+01	3.10E+01		6.24E-01	No	----	----
Metals								
Lead	mg/L	NA ^{f/}	NA		7.1	NA	----	----

^{a/} Source: ADEM, 1998.

^{b/} mg/kg = milligrams per kilogram.

^{c/} J = compound detected above method detection limit and less than practical quantitation limit (PQL). Reported concentration is a laboratory estimate.

^{d/} mg/L = milligrams per liter.

^{e/} ---- = Area weighted average not calculated because maximum concentration was below both screening levels.

^{f/} NA = not applicable.

average of xylenes (1.39 mg/kg) is below the Tier 1 RBSLs for xylenes. Calculations for the area-weighted average concentration of total xylenes are provided in Appendix C.

SECTION 5

EVALUATION OF NATURAL ATTENUATION

5.1 INTRODUCTION

It is important to consider the potential for natural biodegradation of BTEX compounds in groundwater when determining whether or not dissolved fuel hydrocarbon contamination presents a substantial continuing threat to human health and the environment, and when deciding what type of remedial alternative will be most cost effective in eliminating or abating these threats. Over the past two decades, numerous laboratory and field studies have demonstrated that subsurface microorganisms can degrade a variety of hydrocarbons (Lee, 1988). This process occurs naturally when sufficient oxygen (or other electron acceptors) and nutrients are available in the groundwater (see Section 5.4). The rate of natural biodegradation is generally limited by the lack of oxygen (or other electron acceptors) rather than by the lack of nutrients such as nitrogen or phosphorus. The supply of oxygen to unsaturated soil is constantly renewed by vertical diffusion from the atmosphere. The supply of oxygen to a shallow, fuel-contaminated aquifer is constantly renewed by the influx of oxygenated groundwater from upgradient recharge and by the vertical diffusion of oxygen from the unsaturated soil zone into the groundwater (Borden and Bedient, 1986). The rate of natural biodegradation in unsaturated soil and shallow aquifers is largely dependent upon the types and degree of weathering of the contaminants and the rates at which oxygen and other electron acceptors enter the contaminated media.

The positive effect of natural attenuation processes (e.g., advection, dispersion, sorption, and biodegradation) on reducing the actual mass of fuel-related contamination dissolved in groundwater has been termed remediation by natural attenuation (RNA). To estimate the impact of natural attenuation on the fate and transport of BTEX compounds dissolved in groundwater at a site, two important lines of evidence should be demonstrated (Wiedemeier *et al.*, 1995). The first is a documented loss of contaminants at the field scale. One way to show loss of contaminant mass is to use historical monitoring data to show that plume concentrations and extents are static or decreasing over time. At some sites, dissolved concentrations of biologically recalcitrant tracers found in most fuel contamination can be used in conjunction with aquifer hydrogeologic parameters, such as groundwater seepage velocity, to demonstrate that a reduction in contaminant mass is occurring. The second line of evidence involves the use of geochemical data in mass-balance calculations to show that areas with BTEX contamination can be correlated to areas with depleted electron acceptor (e.g., oxygen, nitrate, and sulfate) concentrations and increases in metabolic fuel degradation byproduct concentrations (e.g., methane, sulfide, and ferrous iron). With this site-specific information, groundwater flow and solute transport data can be

used to estimate the extent of RNA occurring in site groundwater. Evaluation of data collected during confirmation sampling indicates that natural chemical attenuation of dissolved fuel hydrocarbon contaminants is occurring at Site ST-001. Although dissolved hydrocarbons remaining in groundwater at the site do not presently pose a risk to human health or the environment, RNA will continue to reduce levels of dissolved contaminants in the shallow aquifer.

During the July 1997 groundwater sampling event, data were collected to determine if RNA processes, particularly biodegradation of groundwater contaminants, are occurring in site groundwater. The two lines of evidence discussed above, documented loss of contaminant mass at the field scale and geochemical evidence, are used herein to support the occurrence of natural attenuation, as described in the following sections.

5.2 OBSERVED CHANGES IN CHEMICAL CONCENTRATIONS IN GROUNDWATER

Based on the 1991 through 1998 groundwater monitoring results summarized in Table 4.4, the concentrations of dissolved BTEX have generally been decreasing at the sampling points around the Site ST-001 source area. In 1991, total BTEX was detected in samples from all four wells installed at that time (GMW-1 through GMW-4). Total BTEX was detected in GMW-44 in 1994 (GMW-44 was installed that year), but not in the three other wells sampled (GMW-42, GMW-43, and GMW-45). In 1996 and 1998, significant concentrations of BTEX compounds were detected in samples from the downgradient wells (GMW-4 and GMW-44) and at low concentrations in GMW-3 (4.1 µg/l in 1996 and 16 µg/L in 1998). In 1997, BTEX compounds were only detected in the two downgradient wells, GMW-4 and GMW-44. Between 1996 and 1998, the total BTEX concentration detected in groundwater from GMW-4 decreased from 17,050 µg/L to 5,780 µg/L. Although the total BTEX concentration in well GMW-44 increased from 801 µg/L to 1,166 µg/L between 1996 and 1997, BTEX concentrations showed a declining trend in 1998. Benzene concentrations in samples from GMW-44 decreased from 43 to 1 µg/L between 1994 and 1998. These data indicate that concentrations of dissolved BTEX are decreasing in both the source area and the area downgradient from the source. The decreases in groundwater BTEX concentrations for well GMW-4 between July 1996 and August 1998 are shown graphically in Figure 4.1. Decreases in observed BTEX concentrations in groundwater indicate that soils are no longer a significant source for groundwater BTEX contamination at Site ST-001.

5.3 ESTIMATING SITE-SPECIFIC CONTAMINANT BIODEGRADATION RATES FOR SATURATED MEDIA

It is useful to distinguish between the effects of nondestructive attenuation processes such as advection, dispersion, and sorption and the effects of destructive attenuation processes such as biodegradation on the mass of dissolved contaminants in the groundwater at Site ST-001. To quantify these effects analytical data and spatial regression or other techniques are typically used to estimate site-specific biodegradation rates for selected contaminants dissolved in groundwater. However, sufficient site data were not available to enable accurate calculation of site-specific degradation rates.

5.4 EVIDENCE OF CONTAMINANT BIODEGRADATION VIA MICROBIALY CATALYZED REDOX REACTIONS

Geochemical data can provide evidence that contaminants are biodegrading in saturated soil and groundwater at Site ST-001. Microorganisms obtain energy for cell production and maintenance by facilitating thermodynamically advantageous reduction/oxidation (redox) reactions involving the transfer of electrons from electron donors to available electron acceptors. This results in the oxidation of the electron donor and the reduction of the electron acceptor. Electron donors at the site are natural organic carbon and fuel hydrocarbon compounds. Fuel hydrocarbons are completely degraded or detoxified if they are used as the primary electron donor for microbial metabolism (Bouwer, 1992). Electron acceptors are elements or compounds that occur in relatively oxidized states, and include oxygen, nitrate, ferric iron, sulfate, and carbon dioxide.

The driving force of contaminant degradation is electron transfer and is quantified by the Gibbs free energy of the reaction (ΔG_r) (Stumm and Morgan, 1981; Bouwer, 1992; Godsey, 1994). Microorganisms preferentially use electron acceptors while metabolizing fuel hydrocarbons (Bouwer, 1992). Dissolved oxygen (DO) is used first as the prime electron acceptor. After the DO is consumed, anaerobic microorganisms typically use electron acceptors in the following order of preference: nitrate, ferric iron hydroxide, sulfate, and finally carbon dioxide.

Depending on the types and concentrations of electron acceptors present (e.g., nitrate, sulfate, or carbon dioxide), pH conditions, and redox potential, anaerobic biodegradation can occur by denitrification, ferric iron reduction, sulfate reduction, or methanogenesis. Other, less common anaerobic degradation mechanisms, such as manganese reduction, may dominate if the physical and chemical conditions in the subsurface favor use of these electron acceptors. Anaerobic destruction of the BTEX and naphthalene compounds is associated with the accumulation of fatty acids, production of methane, solubilization of iron, and reduction of nitrate and sulfate (Cozzarelli *et al.*, 1990; Wilson *et al.*, 1990). Environmental conditions and microbial competition ultimately determine which processes will dominate. Vroblesky and Chapelle (1994) show that the dominant terminal electron accepting process can vary both temporally and spatially in an aquifer with fuel hydrocarbon contamination. Geochemical parameters for site groundwater are discussed in greater detail in the following sections.

5.4.1 Dissolved Oxygen Concentrations

Almost all types of fuel hydrocarbons can be biodegraded under aerobic conditions (Borden, 1994). Mineralization of fuel hydrocarbons to carbon dioxide and water under aerobic conditions involves the use of oxygen as a terminal electron acceptor during metabolism for energy production (Higgins and Gilbert, 1978; Gibson and Subramanian, 1984; Young, 1984). The reduction of molecular oxygen during the oxidation of naphthalene and BTEX compounds yields a significant amount of free energy to the system that the microorganisms can utilize.

DO concentrations were measured at the six site wells (GMW-1, -2, -3, -4, -44, and -45) in July 1997, and are presented in Table 5.1. A comparison of total BTEX and DO concentrations (Figure 5.1) shows that DO concentrations in the area of highest BTEX contamination are depleted (less than 2 mg/L) relative to background levels (approximately 7 mg/L). DO was detected at a concentration of 7.5 mg/L in the groundwater from upgradient monitoring well (GMW-45). Downgradient from the source, DO was detected at concentrations between 0.2 and 3.5 mg/L at GMW-3, GMW-4, and GMW-44. These data indicate that DO is used as an electron acceptor at Site ST-001. Depleted DO concentrations may limit aerobic biodegradation in the areas within and downgradient from the source area. However, additional aerobic degradation can occur as the dissolved contaminants migrate, via advection and dispersion, to more aerobic areas further downgradient.

The average mass ratio of oxygen to total BTEX is approximately 3.14 to 1. This translates to the mineralization of approximately 0.32 mg of BTEX for every 1.0 mg of DO consumed. With a background DO concentration of 7.5 mg/L, the shallow groundwater at this site may have the capacity to assimilate 2.34 mg/L (2,340 µg/L) of total BTEX through aerobic biodegradation. A similar analysis for dissolved naphthalene indicates that the shallow groundwater may have the capacity to assimilate 2,400 µg/L of naphthalene through aerobic biodegradation. These may be conservative estimates of the assimilative capacity of DO because microbial cell mass production was not considered in the stoichiometry.

5.4.2 Nitrate and Nitrite Concentrations

Once anaerobic conditions prevail in the groundwater, nitrate can be used as an electron acceptor by facultative anaerobic microorganisms to mineralize naphthalene and BTEX compounds via either denitrification or nitrate reduction processes. Denitrification is the most energetically favorable of the redox reactions likely to be involved in the oxidation of the contaminants. Although the oxidation of BTEX compounds by nitrate reduction also will yield significant amounts of free energy for microbial use, nitrate reduction is not as energetically favorable as other potential redox reactions. However, nitrate reduction may take precedence over denitrification at Site ST-001 as the groundwater becomes more reducing. However, nitrate can only function as an electron acceptor in microbially facilitated fuel hydrocarbon degradation reactions if the groundwater system has been depleted of oxygen (i.e., the groundwater must be functionally anaerobic). Oxygen is toxic to the enzyme systems used for electron transfer and energy production of nitrate-reducing microorganisms (McCarty, 1972).

Concentrations of both nitrate and nitrite were measured at groundwater monitoring wells in July 1997 (Table 5.1). Results for nitrate (as nitrogen [N]) are shown on Figure 5.2. Nitrate (as N) was detected at a concentration of 3.5 mg/L at upgradient well GMW-45. Downgradient from the source of the dissolved plume, nitrate was detected at concentrations of 0.3 and 1.0 mg/L at GMW-44 and GMW-4, respectively. These results suggest a depletion of nitrate in the BTEX plume downgradient from the source area due to the use of this compound as an electron acceptor at this site.

TABLE 5.1
SUMMARY OF GROUNDWATER GEOCHEMICAL RESULTS
 SITE ST-001, GUNTER ANNEX
 MAXWELL AFB, ALABAMA

Sample Number	Date Sampled	Redox Potential (mV) ^{a/}	Dissolved Oxygen (mg/L) ^{b/}	Ferrous Iron (mg/L)	Manganese (mg/L)	Methane (mg/L)	Nitrate (as N) (mg/L)	Nitrite (as N) (mg/L)	Sulfide (mg/L)	Sulfate (mg/L)
GMW-1	7/10/97	177	7.0	ND ^{c/}	ND	----	3.0	0.020	0.012	0.76
GMW-2	7/9/97	137	5.2	0.04	ND	----	2.7	0.007	ND	0.75
GMW-3	7/10/97	111	3.5	0.06	ND	----	1.6	0.007	ND	0.34
GMW-4	7/10/97	37.2	0.2	2.18	0.40	0.0064	1.0	0.001	0.024	0.18J ^{e/}
GMW-44	7/10/97	71.1	1.8	2.84	0.30	----	0.3	0.006	0.130	0.40
GMW-45	7/9/97	116	7.5	0.01	0.10	ND	3.5	0.040	0.010	2.76

^{a/} mV = millivolts.

^{b/} mg/L = milligrams per liter.

^{c/} ND = not detected.

^{d/} ---- = not analyzed.

^{e/} J = Indicates an estimated value. The compound was detected but was below the laboratory reporting limit.

The stoichiometry of BTEX mineralization to carbon dioxide and water is caused by denitrification (in the absence of microbial cell production) through anaerobic microbial biodegradation. The average mass ratio of nitrate to total BTEX is approximately 4.9 to 1. This translates to the mineralization of approximately 0.20 mg of BTEX for every 1.0 mg of nitrate that is reduced. Because the nitrate concentrations are reported as nitrogen, the values must be multiplied by 4.42 to be converted to mg/L as NO_3^- . With a background NO_3^- concentration of 15.5 mg/L, the shallow groundwater at this site may have the capacity to assimilate 3.04 mg/L (3,040 $\mu\text{g/L}$) of total BTEX through denitrification. A similar analysis for dissolved naphthalene indicates that the shallow groundwater may have the capacity to assimilate 3,270 $\mu\text{g/L}$ of naphthalene. These may be conservative estimates of the assimilative capacity of nitrate because microbial cell mass production was not considered in the stoichiometry.

5.4.3 Dissolved Manganese Concentrations

Manganese also can be used as an electron acceptor to facilitate the oxidation of naphthalene and BTEX compounds under anaerobic and slightly reducing conditions. The reduction of manganese to oxidize naphthalene and BTEX compounds yields essentially as much free energy to the system as aerobic respiration. Under anaerobic and slightly reducing conditions, manganese reduction is the second-most energetically favorable redox reaction that can be used to biodegrade naphthalene and BTEX compounds.

Reduced manganese concentrations were measured in groundwater samples collected on July 1997 and are presented in Table 5.1. As shown on Figure 5.3, concentrations of reduced manganese are lowest upgradient from and crossgradient to the source of the plume and are higher downgradient from the source area (GMW-4 and GMW-44), indicating that reduction of manganese is an operative biodegradation mechanism at the site. In general, the reduction of manganese is limited to the region where DO concentrations become limiting to aerobic degradation. Although the data suggest that manganese reduction is a biodegradation mechanism at the site, the low concentrations of reduced manganese detected in groundwater samples, indicate that manganese reduction is not a significant biodegradation mechanism at this site.

5.4.4 Ferrous Iron Concentrations

Ferrous iron (Fe^{2+}) concentrations were measured in groundwater samples collected on July 1997 and are presented in Table 5.1. As shown on Figure 5.3, concentrations of ferrous iron are lowest upgradient from and lateral to the source of the plume and are higher downgradient from the source area (GMW-4 and GMW-44). This suggests that reduction of ferric iron hydroxide (Fe^{3+}) to ferrous iron (Fe^{2+}) is an operative biodegradation mechanism at the site. The data suggest that ferric iron hydroxide is being reduced during biodegradation of BTEX compounds in the region downgradient from the source area. In general, the reduction of ferric iron hydroxide coincides with the region where depleted DO concentrations become limiting for aerobic degradation.

Recent evidence suggests that the reduction of ferric iron to ferrous iron cannot proceed at all without microbial mediation (Lovley and Phillips, 1988; Lovley *et al.*, 1991; Chapelle, 1993). None of the common organic compounds found in low-

temperature, neutral, reducing groundwater could reduce ferric oxyhydroxides to ferrous iron under sterile laboratory conditions (Lovley *et al.*, 1991). This means that the reduction of ferric iron requires microbial mediation by microorganisms with the appropriate enzymatic capabilities. Because the reduction of ferric iron cannot proceed without microbial intervention, the elevated concentrations of ferrous iron measured in contaminated groundwater at the site is a strong indicator of microbial activity. Although the data indicate that sulfate reduction is a biodegradation mechanism at the site, the relatively low concentrations of reduced (ferrous) iron detected in groundwater samples indicate that, iron reduction is not a significant biodegradation mechanism at this site.

5.4.5 Sulfate and Sulfide Concentrations

Sulfate may be used as an electron acceptor during microbial degradation of fuel hydrocarbons under anaerobic and strongly reducing conditions. Sulfate is reduced to sulfide during the oxidation of naphthalene and BTEX. Sulfate and sulfide concentrations are listed in Table 5.1 and the distribution of these compounds shown on Figures 5.2 and 5.4, respectively. The lower magnitude of sulfate detections and elevated sulfide concentrations downgradient from the source area are an indication that sulfate reduction is occurring in and downgradient from the source area where anaerobic conditions predominate. The stoichiometry of BTEX mineralization to carbon dioxide, sulfur, and water is controlled by sulfate reduction through anaerobic microbial biodegradation. The average mass ratio of sulfate to total BTEX is approximately 4.7 to 1 and the mass ratio of sulfate to naphthalene is approximately 4.5 to 1. This translates to the mineralization of approximately 0.21 mg or 0.22 mg of total BTEX or naphthalene, respectively, for every 1.0 mg of sulfate consumed.

Assuming a background sulfate concentration of 2.76 mg/L, the shallow groundwater at this site has the capacity to assimilate approximately 0.54 mg/L (540 µg/L) of total BTEX during sulfate reduction. This may be a conservative estimate of the assimilative capacity of sulfate in the groundwater because microbial cell mass production has not been taken into account by the stoichiometry.

5.4.6 Methane and Carbon Dioxide Concentrations

On the basis of free energy yield and oxidizing potential, the carbon dioxide-methane ($\text{CO}_2\text{-CH}_4$) redox couple also could be used to oxidize fuel hydrocarbon compounds to carbon dioxide and water once the groundwater is sufficiently reducing. To attain these reducing conditions, other electron acceptors (oxygen, nitrate, ferrous iron, manganese, and sulfate) must first be reduced. This redox reaction is called methanogenesis or methane fermentation. Methanogenesis yields the least free energy to the system in comparison to other chemical species. The presence of methane in groundwater at elevated concentrations relative to background concentrations is a good indicator of methane fermentation.

Methane concentrations were measured at one upgradient groundwater monitoring well (GMW-45) and one downgradient well (GMW-4) in July 1997. Methane data are included in Table 5.1 and shown on Figure 5.4. Methane was detected at GMW-4, located immediately downgradient from the source area, at a concentration of 6.4 µg/L

(0.0064 mg/L). The presence of methane in this groundwater sample indicates that methanogenesis is occurring in the center of the plume where redox conditions can be expected to be the most reducing. The mass of reactive organic material present in the saturated soil and groundwater is potentially sufficient to reduce the oxidizing capacity to levels required for methanogenesis. However, the low magnitude of the detected methane concentration indicates that methanogenesis does not contribute significantly to the BTEX/naphthalene assimilative capacity of the groundwater.

5.4.7 Reduction/Oxidation Potential

Redox potential is a measure of the relative tendency of a solution to accept or transfer electrons. The redox potential of a groundwater system depends on which electron acceptors are being reduced by microbes during BTEX oxidation. The redox potentials measured at Site ST-001 ranges from 37 millivolts (mV) at GMW-4 to 177 mV at GMW-1. These redox potentials are within the range in which reduction of oxygen, nitrate, and manganese occurs (Stumm and Morgan, 1981). Although the redox potentials measured at the existing wells are outside the range for sulfate, ferric iron hydroxide, and carbon dioxide reduction, reduced forms of these compounds measured in downgradient groundwater samples indicates that reduction of these compounds has occurred in the center of the plume where redox conditions are expected to be the most reducing. Many authors have noted that measured redox data alone cannot be used to reliably predict the biodegradation that may be operating at a site (e.g. Stumm and Morgan, 1981; Godsey, 1994; Lovley *et al.*, 1994). This is because the platinum electrode probes are not sensitive to some redox couples (e.g., the sulfate/sulfide redox couple). Redox potential data for the site are summarized in Table 5.1 and shown on Figure 5.1. As expected, areas with lower redox potentials appear to coincide with areas of high BTEX contamination; low DO, sulfate, and nitrate concentrations; and elevated manganese and ferrous iron concentrations.

5.5 EXPRESSED ASSIMILATIVE CAPACITY

The data presented in the preceding subsections suggest that degradation of dissolved BTEX and naphthalene is occurring primarily through the microbially mediated processes of aerobic biodegradation and anaerobic denitrification and sulfate reduction. On the basis of the stoichiometry, the total expressed assimilative capacity of the groundwater resulting from oxygen and sulfate reduction and denitrification is 5,920 µg/L for dissolved BTEX and 6,240 µg/L for dissolved naphthalene (Table 5.2). The additional assimilative capacities resulting from manganese, ferric iron, and carbon dioxide reduction were excluded from these estimates because these processes appear to be less significant degradation mechanisms. In addition, the assimilative capacity calculations may be conservative because they do not account for microbial cell mass production. The highest dissolved BTEX concentration measured at the site in 1998 was 8,500 µg/L and the maximum naphthalene concentration measured in 1997 was 624 µg/L.

The geochemical data indicate that the groundwater has sufficient assimilative capacity to support substantial biodegradation of dissolved BTEX and naphthalene and to limit plume migration. This observation is supported by the fact that the site is an open system and that upgradient groundwater will continue to flow through the site and

TABLE 5.2
ESTIMATE OF ASSIMILATIVE CAPACITY OF
SATURATED SOIL AND GROUNDWATER
SITE ST-001, GUNTER ANNEX
MAXWELL AFB, ALABAMA

Electron Acceptor	Background Concentration ($\mu\text{g/L}$) ^{b/}	BTEX Assimilative Capacity ^{a/} ($\mu\text{g/L}$)	Naphthalene Assimilative Capacity ^{a/} ($\mu\text{g/L}$)
Oxygen	7500	2,340	2,400
Nitrate	15,400	3,040	3,270
Sulfate	2,760	540	570
Total		5,920	6,240
Maximum 1997 Concentration		12,530	624

^{a/} Calculations based on the ratio of total mass of electron acceptors required to oxidize a given mass of contaminant.

^{b/} $\mu\text{g/L}$ = micrograms per liter.

replenish electron acceptor concentrations to sustain biodegradation of the dissolved plume. Ultimately, the fate of dissolved petroleum hydrocarbons in groundwater and the potential impact on receptors are dependent on the relationship between the kinetics of biodegradation and the solute transport velocity (Vroblesky and Chapelle, 1994). Although the expressed assimilative capacity is a strong indicator that biodegradation is occurring, it is not a confirmation that biodegradation will proceed to completion before potential downgradient receptors are impacted.

A closed system with 2 liters of water can be used to help visualize the physical meaning of assimilative capacity. Assume that the first liter contains no fuel hydrocarbons, but it contains fuel-degrading microorganisms and has an assimilative capacity of exactly "x" μg of fuel hydrocarbons. The second liter has no assimilative capacity; however, it contains fuel hydrocarbons. As long as these 2 liters of water are kept separate, biodegradation of the fuel hydrocarbons will not occur. If these 2 liters are combined in a closed system, biodegradation will commence and continue until the fuel hydrocarbons are depleted, the electron acceptors are depleted, or the environment becomes acutely toxic to the fuel-degrading microorganisms. Assuming a nonlethal environment, if fewer than "x" μg of fuel hydrocarbons were in the second liter, all of the fuel hydrocarbons will eventually degrade given a sufficient time; likewise, if greater than "x" μg of fuel hydrocarbons were in the second liter of water, only "x" μg of fuel hydrocarbons would ultimately degrade. The groundwater beneath Site ST-001 is an open system that continually receives additional electron receptors from flow through the aquifer and infiltration of precipitation. This means that the assimilative capacity is not fixed as it is in a closed system, and therefore cannot be compared directly to contaminant concentration in the groundwater. Rather, the expressed assimilative capacity of groundwater is intended to serve as a qualitative tool. The fate of BTEX in groundwater and the potential impact on receptors are dependent on the relationship between the kinetics of biodegradation and the solute transport velocity (Vroblesky and Chapelle, 1994). The significant expressed assimilative capacity (Table 5.2) is a strong indicator that biodegradation is occurring at Site ST-001.

SECTION 6

CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

Twenty-two months of bioventing treatment of vadose-zone soils at Site ST-001 successfully reduced the concentrations of BTEX and PAH compounds to concentrations below the ARBCA RBSLs. Residual hydrocarbons were only detected in laboratory soil samples collected from depths below 22 feet bgs, and only at low concentrations that no longer pose a threat to receptors through leaching to groundwater or volatilization into future onsite buildings or offsite structures. In addition, the presence of high concentrations of soil gas oxygen indicate that subsurface conditions are favorable for continued natural attenuation of the remaining hydrocarbons in the vadose zone.

Dissolved BTEX, PAHs, and lead in the groundwater at Site ST-001 do not and will not present a significant health or environmental risk. All target compounds detected in the confirmation groundwater samples and samples collected in 1998 were below RBSLs for inhalation of emissions by a resident child. *Because the surficial aquifer beneath Gunter Annex is not used as a potable water source, and there are no seeps or other groundwater discharge points in the vicinity of the site, dissolved hydrocarbons in the groundwater do not pose a risk to human health or to ecological receptors through ingestion or direct contact. The depth (greater than 17 feet bgs) of residual soil contamination exceeding ISLs eliminates the direct contact exposure scenario.* Although limited BTEX plume migration may occur, historical groundwater data show an overall decreasing trend for dissolved BTEX concentrations in the ST-001 source area (Table 4.4), and natural hydrodynamic and chemical attenuation processes should continue to reduce dissolved BTEX and PAH concentrations.

6.2 RECOMMENDATIONS

The confirmatory soil and groundwater sampling results presented in Sections 4.1 and 4.2 support an Air Force no-further-response-action-planned (NFRAP) decision for soil and groundwater contaminated by gasoline and diesel fuel in the immediate vicinity and downgradient from the former USTs, pursuant to closure of Site ST-001. Based on the site closure soil and groundwater sample analytical results summarized in Tables 4.1, 4.3 and 4.4, site closure with no further remedial action at the Site ST-001 is recommended. Concentrations of lead and all BTEX and PAH compounds are below their respective RBSLs, and remaining fuel hydrocarbons in the soils and groundwater do not and will not present a significant risk to human health and/or the environment at or downgradient from the site.

ADEM has made the determination that no further subsurface investigative or subsurface corrective actions will be required for Site ST-001 (ADEM, 1999). The bioventing system has been dismantled and removed from the site, and the VW and MPs have been properly abandoned by a base contractor.

SECTION 7

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APPENDIX A
CONFIRMATION SAMPLING AND ANALYSIS PLAN

DRAFT FINAL

**Confirmation Sampling and Analysis Plan for
Site ST-001, Former Building 408,
Gunter Annex**



**Maxwell Air Force Base
Alabama**

Prepared For

**Air Force Center for Environmental Excellence
Brooks Air Force Base, Texas**

and

**42 CES/CEVR
Maxwell Air Force Base, Alabama**

May 1997



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**CONFIRMATION SAMPLING AND ANALYSIS PLAN
FOR SITE ST-001, FORMER BUILDING 408,
GUNTER ANNEX**

**MAXWELL AIR FORCE BASE
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ACRONYMS AND ABBREVIATIONS

°C	degrees centigrade
µg/L	micrograms per liter
ADEM	Alabama Department of Environmental Management
ACL	alternative corrective action limit
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
ASTM	American Society for Testing and Materials
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAL	corrective action limit
CES/CEVR	Civil Engineering Squadron, Environmental Group
COPC	chemical of primary concern
DO	dissolved oxygen
DOT	US Department of Transportation
ft/ft	foot per foot
ID	inside diameter
mg/kg	milligrams per kilogram
MP	monitoring point
NFRAP	No Further Response Action Planned
PAH	polynuclear aromatic hydrocarbon
Parsons ES	Parsons Engineering Science, Inc.
PID	photoionization detector
QC	quality control
RBCA	risk-based corrective action
RBSL	risk-based screening level
redox	reduction oxidation
SAP	Sampling and Analysis Plan
SSL	soil screening level
TRPH	total recoverable petroleum hydrocarbons
TVH	total volatile hydrocarbons
TVHA	total volatile hydrocarbon analyzer
USACE	US Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	US Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound
VW	vent well

SECTION 1

INTRODUCTION

This confirmation sampling and analysis plan (SAP) for former Building 408, Site ST-001, at the Gunter Annex, Maxwell Air Force Base (AFB), Alabama has been prepared by Parsons Engineering Science, Inc. (Parsons ES) for submittal to the Alabama Department of Environmental Management (ADEM); the US Air Force Center for Environmental Excellence (AFCEE), Brooks AFB, Texas; and 42 Civil Engineering Squadron, Environmental Group (CES/CEVR), Maxwell AFB, Alabama. ADEM provides oversight of underground storage tank (UST) work at Gunter Annex. The SAP is intended to guide soil and groundwater sampling at Site ST-001 to document the effectiveness of remediation of petroleum-hydrocarbon-contaminated soils and to provide data for a risk-based assessment of contaminants remaining in site soils and groundwater. Site ST-001 is the location of a release of diesel fuel and/or gasoline from two former USTs and their associated product piping.

In 1994, Site ST-001 was selected as a pilot test site for the AFCEE Extended Bioventing Program. This ongoing program involves more than 50 *in situ* bioventing sites at 32 military installations nationwide and provides funding for pilot- and full-scale bioventing system installation, extended operation of installed bioventing systems, and completion of confirmatory soil sampling and site closure documents, if extended bioventing testing results indicate adequate site remediation has been achieved.

The pilot-scale bioventing system was installed and initial pilot testing was performed in September 1995 (Parsons ES, 1995). Following initial testing, the bioventing system was optimized, and system operation continued for 1 year. One-year testing was performed in October 1996. The purpose of the pilot test at Site ST-001 was to evaluate the effectiveness of bioventing in remediating unsaturated soils contaminated with petroleum hydrocarbons thought to have resulted from diesel fuel and/or gasoline released from the former USTs. Based on the results of the extended bioventing test, *in situ* bioventing appears to have reduced petroleum hydrocarbon contamination in site soils sufficiently to meet current ADEM (1995) corrective action limits (CALs) for total recoverable petroleum hydrocarbon (TRPH) concentrations; however, ADEM is currently in the process of finalizing new risk-based corrective action (RBCA) requirements for petroleum release sites.

The objective of the confirmation soil and groundwater sampling is to document the effectiveness of soil remediation at Site ST-001 and to demonstrate compliance with anticipated ADEM RBCA requirements for closure. The proposed confirmation sampling described in Section 4 targets vadose zone soils and groundwater in the vicinity of the former USTs, as well as impacted groundwater downgradient from the

site. Soil and groundwater data will be used to prepare a streamlined risk-based assessment of residual site contamination, and groundwater data also will be used to evaluate the rate of natural chemical attenuation occurring in groundwater. The groundwater and soil sampling effort is being performed as part of the AFCEE Extended Bioventing project. It is anticipated that analytical results will support an Air Force no-further-response-action-planned (NFRAP) recommendation, and that ADEM will grant site closure.

This SAP consists of nine sections, including this introduction. Section 2 includes site description, history, and summaries of previous investigations and remediation activities. Section 3 summarizes current ADEM CALs and provides a brief discussion of anticipated ADEM RBCA requirements. A detailed SAP is presented in Section 4. Analytical results will be presented in a confirmation sampling report as described in Section 5. Section 6 lists Maxwell AFB support requirements, and Section 7 presents the proposed project schedule. Air Force, regulatory, and contractor points of contact are provided in Section 8, and the cited references are provided in Section 9.

SECTION 2

SITE DESCRIPTION

2.1 SITE LOCATION AND HISTORY

Information provided in this section is summarized from a release investigation report by Radian Corporation (1995). Site ST-001 is located in the west-central portion of Gunter Annex, Montgomery, Alabama (Figure 2.1). The site is bordered by Libby Street on the south and South Hodges Avenue on the west. A grassy, open area bounds the site on the remaining sides. The layout of Site ST-001 is shown in Figure 2.2.

Site ST-001, also known as the old Base Motor Pool Service Station, was originally used for dispensing petroleum products for motorized vehicles beginning in the 1940's. Two 10,000-gallon USTs were located north of Building 408; one tank was used to store diesel fuel, and the other stored gasoline. The tanks and related piping were removed in March 1994. After the tanks were removed, the excavation was backfilled with clean soil and covered with gravel. Building 408 was demolished in 1995, and the site is currently vacant and inactive.

2.2 SITE GEOLOGY AND HYDROGEOLOGY

Site ST-001 is underlain by Quaternary alluvial deposits consisting of sand, gravel, silt, and clay layers. The grain size generally increases with depth, with approximately 8 to 10 feet of silty, sandy clay overlying sand and gravely sand. In the vicinity of the former UST and product piping excavation, much or all of the silty clay appears to have been removed and replaced with clean fill consisting of a mixture of clay, sand, and gravel.

At Site ST-001, shallow groundwater occurs under water table (unconfined) conditions. In July 1996, the surface of the water table was measured between 20 and 25 feet below ground surface (bgs), and groundwater was determined to flow toward the west-northwest with an average hydraulic gradient of 0.005 foot per foot (ft/ft) (Williams Engineering, 1996).

2.3 PREVIOUS INVESTIGATIONS

2.3.1 1991 US Army Corps of Engineers Investigation

During 1991, the United States Army Corps of Engineers (USACE, 1992) performed an initial investigation of Site ST-001 that included the installation of four groundwater monitoring wells (GMW-1 through -4, shown on Figure 2.2). Soil and groundwater samples were collected at these four locations. Soil samples were

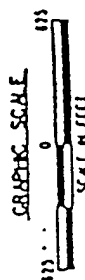
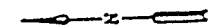
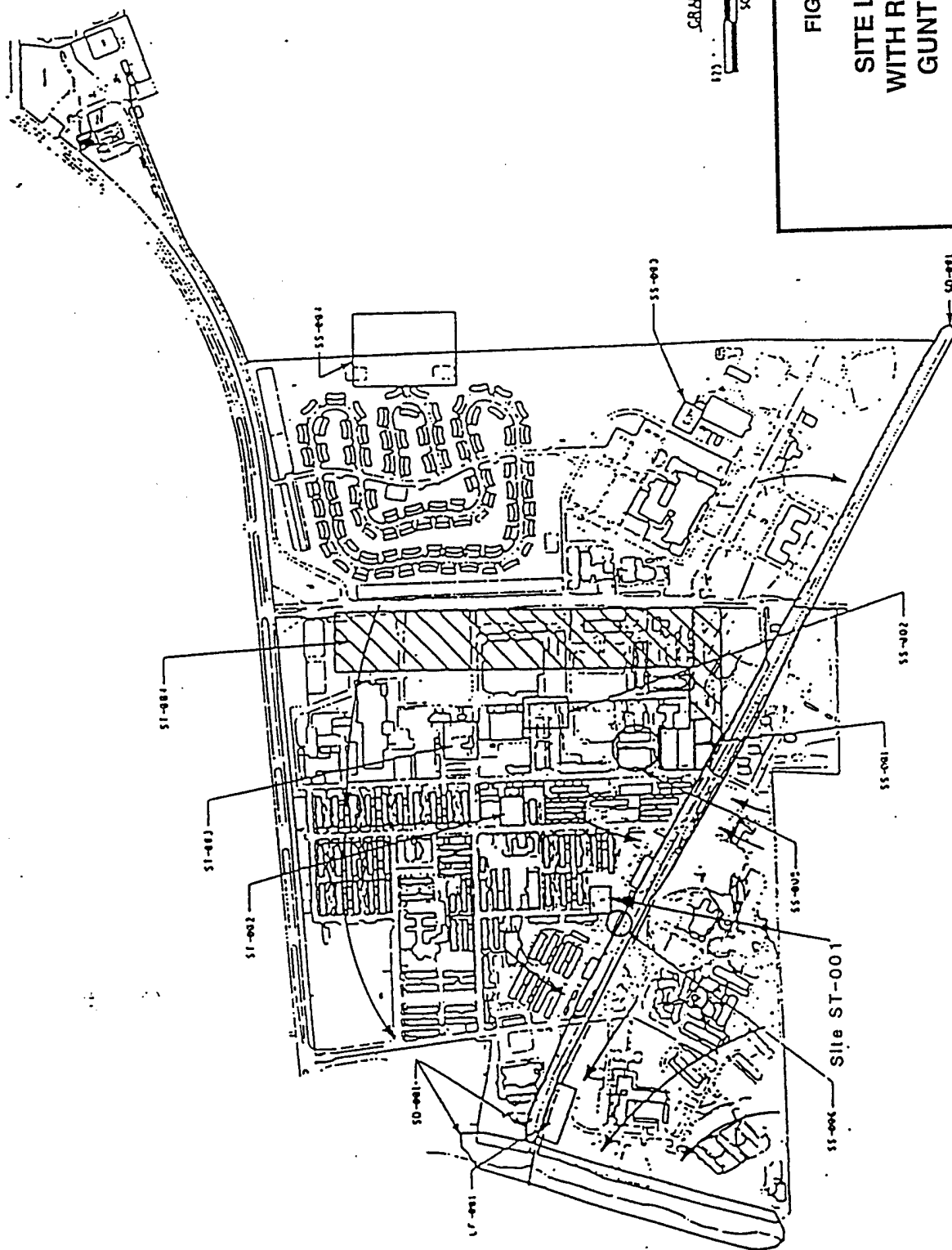
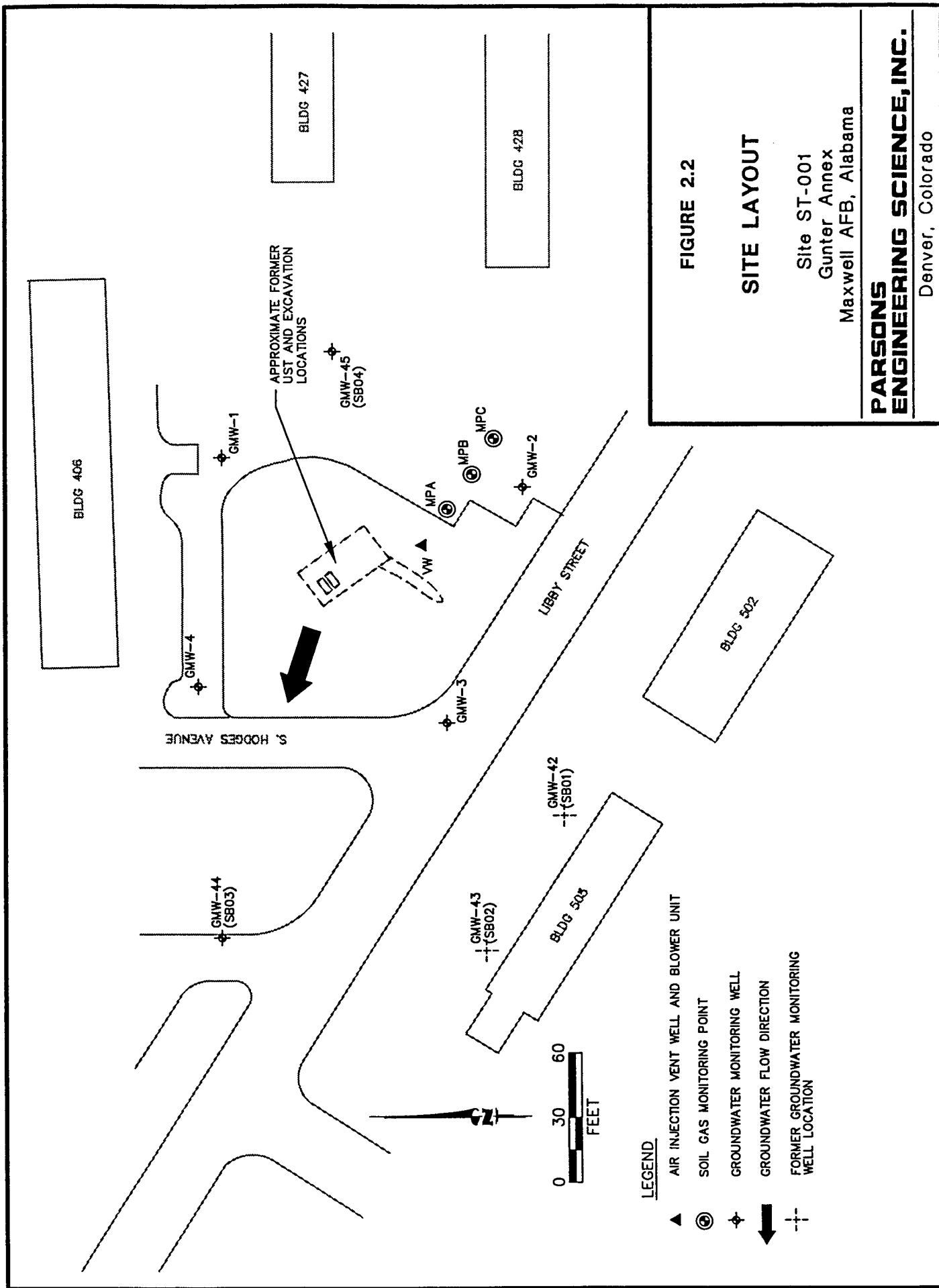


FIGURE 2.1
SITE LOCATION
WITH RESPECT TO
GUNTER ANNEX

Site ST-001
Gunter Annex
Maxwell AFB, Alabama

**PARSONS
ENGINEERING SCIENCE, INC.**
Denver, Colorado





analyzed for TRPH and groundwater samples were analyzed for benzene, toluene, ethylbenzene, total xylenes (BTEX), and lead. Analytical results indicated that TRPH concentrations exceeded 100 milligrams per kilogram (mg/kg) in soil samples collected from each of the monitoring well borings. The highest TRPH concentration, 1,117 mg/kg, was detected in the boring for GMW-2 at approximately 20 feet bgs. Soil analytical results from the USACE (1992) and subsequent investigations are presented in Table 2.1, and the estimated extent of soil contamination at Site ST-001 is shown on Figure 2.3.

Dissolved contaminant concentrations in a groundwater sample from GMW-4 exceeded current ADEM maximum contaminant levels of 5 micrograms per liter ($\mu\text{g/L}$) and 1,000 $\mu\text{g/L}$ for benzene and toluene, respectively. The benzene concentrations in the GMW-1 and GMW-3 groundwater samples also exceeded current ADEM contaminant levels. Groundwater analytical results from the USACE (1992) and subsequent investigations are presented in Table 2.2.

2.3.2 1994 Investigations

Following removal of the two USTs in 1994, Radian Corporation (1995) installed four groundwater monitoring wells (GMW-42 through 45) in the vicinity of Site ST-001 (Figure 2.2) and collected soil and groundwater samples at these locations. Soil and groundwater samples were analyzed for TRPH, BTEX, and lead. Findings indicated relatively insignificant TRPH and BTEX concentrations in soil; however, dissolved petroleum contaminant concentrations were detected at GMW-44, approximately 170 feet downgradient from (west of) the former USTs. Soil and groundwater analytical results from the 1994 Radian investigation are included on Tables 2.1 and 2.2, respectively.

Benchmark Engineering (1994) also performed groundwater sampling for volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PAHs) at GMW-1 and GMW-45 during 1994. During this sampling event, petroleum contamination was not evident at GMW-1; however, trace concentrations of some VOCs and PAHs were evident in samples from GMW-45 (Table 2.2).

2.3.3 Parsons ES Investigation and Bioventing Pilot Test

In September 1995, a pilot-scale bioventing system was installed by Parsons ES (1995) at Site ST-001 to assess the potential of air injection bioventing for remediating the hydrocarbon contamination identified in vadose zone soils. The primary objectives of the pilot test were: 1) to assess the potential for supplying oxygen throughout the contaminated soil interval; 2) to determine the rate at which indigenous microorganisms would degrade fuel when supplied with oxygen-rich soil gas; 3) to evaluate the potential for sustaining fuel biodegradation rates until fuel contamination was remediated to concentrations below regulatory standards; and 4) to determine design parameters, such as air injection vent well (VW) spacing and air injection flow rates, if it was determined that a full-scale bioventing system was necessary to treat the entire volume of contaminated soils at Site ST-001.

TABLE 2.1
SOIL ANALYTICAL RESULTS
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Sample Location	Sample Depth (feet bgs) ^v	Analyte					
		TRPH ^w (mg/kg) ^v	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Xylenes (mg/kg)	Lead (mg/kg)
Corps of Engineers ^w							
GMW-1	5 - 6	719	---	---	---	---	---
	10 - 11.5	59	---	---	---	---	---
	15 - 16.5	548	---	---	---	---	---
	20 - 21.5	95	---	---	---	---	---
	25 - 26.5	272	---	---	---	---	---
	30 - 31.5	71	---	---	---	---	---
GMW-2	5 - 6	111	---	---	---	---	---
	10 - 11.5	633	---	---	---	---	---
	15 - 16.5	42	---	---	---	---	---
	20 - 21.5	1,117	---	---	---	---	---
	25 - 26.5	48	---	---	---	---	---
	30 - 31.5	---	---	---	---	---	---
GMW-3	5 - 6	97	---	---	---	---	---
	10 - 11.5	ND ^p	---	---	---	---	---
	15 - 16.5	225	---	---	---	---	---
	20 - 21.5	441	---	---	---	---	---
	25 - 26.5	ND	---	---	---	---	---
	30 - 31.5	44	---	---	---	---	---
GMW-4	5 - 6	ND	---	---	---	---	---
	10 - 11.5	ND	---	---	---	---	---
	15 - 16.5	118	---	---	---	---	---
	20 - 21.5	86	---	---	---	---	---
	25 - 26.5	ND	---	---	---	---	---
	30 - 31.5	96	---	---	---	---	---
Radian ^w							
SB01 (GMW-42)	0 - 2.5	ND	ND	ND	ND	ND	8.4
	21 - 23	2.84	ND	ND	ND	0.001	2.5
SB02 (GMW-43)	11.5 - 14	ND	ND	0.001	ND	ND	ND
	14 - 16.5	ND	ND	ND	ND	ND	2.7
	21.5 - 24	ND	ND	ND	ND	0.131	5.4
SB03 (GMW-44)	11.5 - 14	ND	ND	ND	ND	0.004	4.3
	19 - 21.5	ND	ND	ND	ND	0.003	2.8
SB04 (GMW-45)	0 - 4	ND	ND	0.026	0.003	0.008	ND
	11.5 - 14	ND	ND	ND	ND	ND	11.1
	14 - 19	ND	ND	ND	ND	0.004	3.5
Parsons ES ^w							
VW-15	15	120	<0.053 ^y	0.38	0.89	7.5	---
VW-20	20	6.9	<0.055	<0.055	1.0	5.9	---
MPA-15	15	410	<0.053	0.12	1.1	7.5	---
MPA-20	20	<3.5	<0.053	<0.053	<0.053	<0.13	---
MPB-15	15	<3.5	<0.052	<0.052	<0.052	<0.13	---
MPB-20	20	<3.7	<0.055	<0.055	<0.055	<0.14	---

^u bgs = below ground surface.

^v TRPH = total recoverable petroleum hydrocarbons.

^u mg/kg = milligrams per kilogram.

^w Soil samples collected in 1991 by US Army Corps of Engineers (1992).

^y --- = not analyzed.

^p ND = not detected; method detection limit not available.

^w Soil samples collected in 1994 by Radian Corporation (1995).

^w Soil samples collected September 12, 1995, by Parsons ES (1995), prior to bioventing system startup.

^y < = analyte concentration is less than the laboratory reporting limit shown.

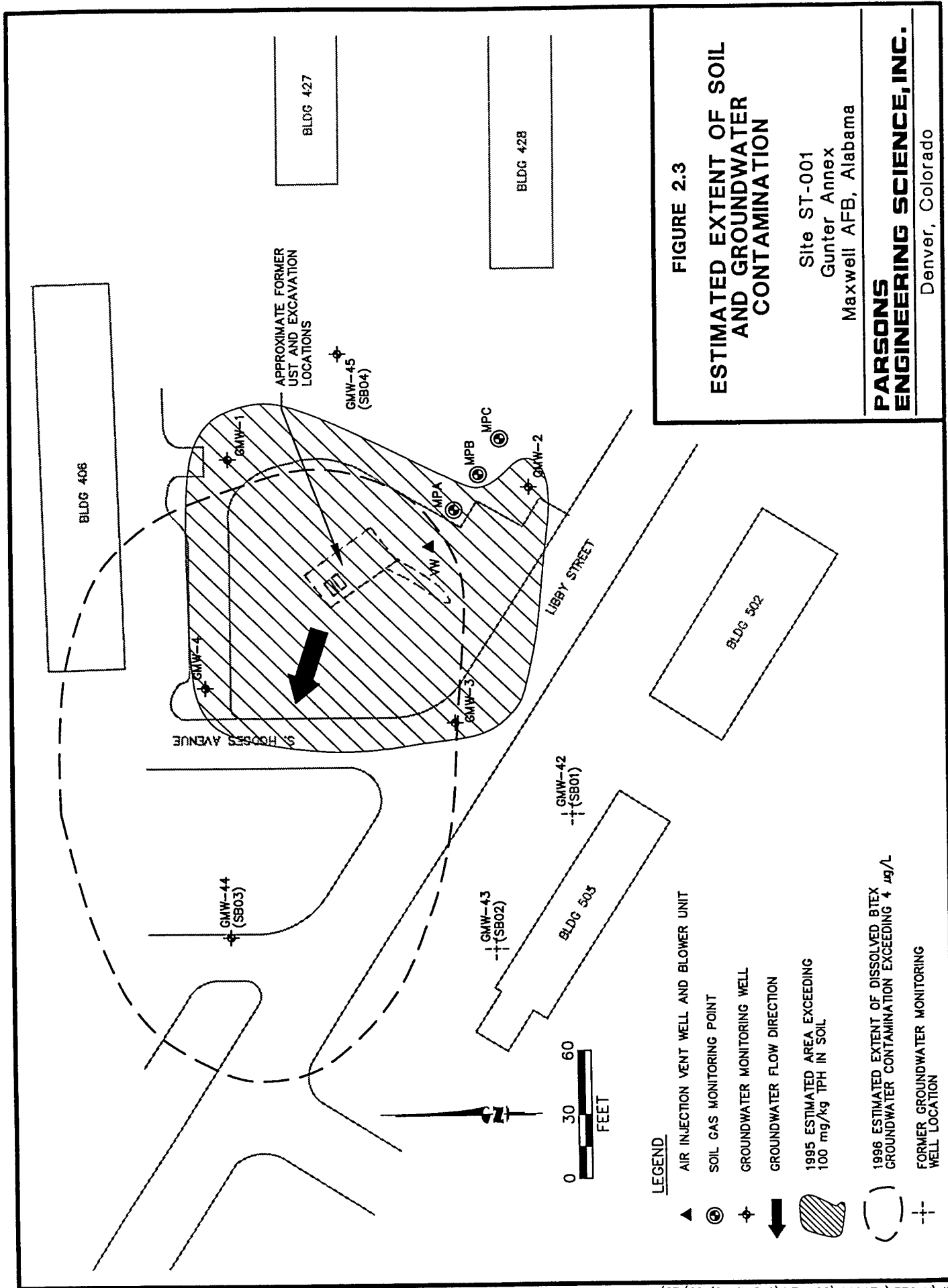


TABLE 2.2
GROUNDWATER ANALYTICAL RESULTS COMPARED TO ADEM CRITERIA
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Corrective Action Limit ^v	Sample Location (Sample Date)	Analyte ^v (units) ^v															
		TRPH (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl- benzene (ug/L)	Xylenes (ug/L)	Lead (ug/L)	n-Butyl benzene (ug/L)	n-Propyl- benzene (ug/L)	Isopropyl- benzene (ug/L)	1,2,4- TMB (ug/L)	1,3,5- TMB (ug/L)	cis-1,2 DCE (ug/L)	TCE (ug/L)	Naphthalene (ug/L)	1-Methyl- naphthalene (ug/L)	2-Methyl- naphthalene (ug/L)
NA ^v		5	1,000	700	10,000	15	NA	NA	NA	NA	NA	70	5	NA	NA	NA	NA
— ^g	GMW-1 (1991) M ^v (7/14/94) B ^v (7/25/96) W ^g	5.1 <1 ^v <1	ND ^v <4 <1	2.2 <1 <1	2.5 <1 <1	40 — —	<1 — —	<1 — —	<1 — —	— — —	— <1 —	— <1 —	— <1 —	— <1 —	ND <1 —	ND <1 —	ND <1 —
—	GMW-2 (1991) M (7/25/96) W	1.7 <1	ND <1	ND <1	ND <1	5 —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	ND — —	— — —	ND — —
—	GMW-3 (1991) M (7/25/96) W	33 1.1	39 <1	31 <1	120 3	78 —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	ND — —	ND — —	ND — —
—	GMW-4 (1991) M (7/25/96) W	290 <500	3,300 7,210	240 1,820	5,200 8,020	43 —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	160 —	19 —	39 —
0.898	GMW-42 (1994) R ^v	ND	ND	ND	ND	1.3 ^v	—	—	—	—	—	—	—	—	—	—	—
1.15	GMW-43 (1994) R	ND	ND	ND	ND	1.0 ^v	—	—	—	—	—	—	—	—	—	—	—
0.902	GMW-44 (1994) R (7/25/96) W	43 37.3	7 189	12 152	25 423	ND —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —	— — —
0.535	GMW-45 (1994) R (7/14/94) B (7/25/96) W	ND 7.7 <1	ND <4 <1	ND 12 <1	ND 37 <1	2.9 ^v — —	— 1.4 —	— 6 —	— 2.8 —	— 32 —	— 9.4 —	— 3.3 —	— <1 —	— 2.1 —	— <1 —	— 2.1 —	— <1 —

^v TRPH = total recoverable petroleum hydrocarbons; TMB = trimethylbenzene; DCE = dichloroethene; TCE = trichloroethene.
^v mg/L = milligrams per liter; µg/L = micrograms per liter.
^v ADEM, 1995.

^v NA = no ADEM corrective action level available for this analyte.

^v Results from 1991 investigation (USACE, 1992).

^v --- = not analyzed.

^v ND = not detected; method detection limit not available.

^v Results from 1994 investigation (Benchmark Engineering, 1994).

^v < = analyte concentration is less than the laboratory reporting limit shown.

^v 1996 groundwater monitoring results (Williams Engineering, Inc., 1996).

^v Results from 1994 investigation (Radian Corporation, 1995).

^v Analyte detected in method blank.

The pilot-scale bioventing system was installed in the vicinity of the former USTs and consisted of one VW, three vapor monitoring points (MPs), and a blower unit (Figure 2.2). During installation of the pilot-scale system, soil and soil gas sampling, and respiration and air permeability testing were performed. Based on oxygen influence and air permeability testing performed during installation of the pilot-scale system, the long-term radius of oxygen influence around the VW was expected to exceed 65 feet at all depths and 100 feet at depths between 14 and 20 feet bgs. From this information, it was determined that the pilot-scale bioventing system was capable of delivering oxygen throughout the contaminated soil zone, making installation of a larger bioventing system unnecessary. A detailed description of the pilot-scale bioventing system design and initial testing results are provided in the Interim Pilot Test Results report prepared by Parsons ES (1995) for this site.

Following completion of pilot-scale system installation and testing, the system was started, optimized, and operated continuously until September 1996. In September, the system was shut down for over 1 month to allow soils and soil gas to come to equilibrium in order to compare initial and 1-year conditions. Soil gas samples were collected, and *in situ* respiration testing was performed from 29 October through 1 November 1996 following 1 year of system operation. The blower system was restarted following 1-year testing to continue bioventing treatment of site soils. Initial soil sampling results and initial and 1-year soil gas sampling and respiration testing results have been provided by Parsons ES (1997) to AFCEE and Maxwell AFB and are summarized below.

2.3.3.1 Soil Sampling Results

During installation of the pilot-scale bioventing system, soil samples were collected from the VW and MP boreholes to determine the extent of petroleum hydrocarbon contamination in the vicinity of the former USTs (Figure 2.2). Six soil samples collected at the VW, MPA, and MPB boreholes, from depths of 15 and 20 feet bgs, were submitted for laboratory analysis of several parameters, including TRPH and BTEX. As shown in Table 2.1, TRPH, toluene, ethylbenzene, and xylenes were detected in soil samples collected from the VW and MPA boreholes, which are located nearest the former USTs (Figure 2.2). TRPH concentrations of 120 mg/kg and 410 mg/kg were detected at VW-15 and MPA-15, respectively. These concentrations exceeded the ADEM (1995) CAL of 100 mg/kg for TRPH. Toluene, ethylbenzene, and xylenes were detected at maximum concentrations of 380 µg/kg, 1,100 µg/kg, and 7,500 µg/kg, respectively. Benzene was not detected in any of the six soil samples (Table 2.1).

2.3.3.2 Soil Gas Sampling Results

Soil gas sampling was performed prior to, and following, 1 year of air injection bioventing to determine relative changes in total volatile hydrocarbon (TVH), BTEX, and oxygen concentrations. Initial soil gas field-screening results at the VW and MPs indicated depleted oxygen concentrations and high TVH concentrations, and suggested that air injection would oxygenate contaminated soils and enhance biodegradation of residual petroleum hydrocarbons. As can be seen from the field-screening results

presented in Table 2.3, static oxygen concentrations in soil gas have increased considerably with continued bioventing at the site. At all MPs, the VW, and at GMW-1 and GMW-45, soil gas oxygen levels were measured at, or near, natural atmospheric levels (20.9 percent) following 1 year of air injection bioventing. The widespread development of near atmospheric levels of soil gas oxygen indicate that biological oxygen demand, and consequently, aerobic fuel hydrocarbon biodegradation rates, have decreased substantially throughout the site, and strongly suggests that very little substrate (fuel hydrocarbons) remains in site soils.

The expected low concentrations of residual petroleum hydrocarbon contamination in site soils is further supported by soil gas field TVH measurements and laboratory results. Soil gas field screening results, presented in Table 2.3, indicate a consistent 2 to 3 order of magnitude reduction in the source area (VW, MPA, and MPB) and lesser, but significant reductions at locations surrounding the source area (MPC, GMW-1, and GMW-45). Initial and 1-year analytical results for MPA-15 and MPA-19 indicate BTEX and TVH concentrations in soil gas have been reduced approximately 3 orders of magnitude during 1 year of bioventing. Field and analytical soil gas results demonstrate that significant reductions in TVH and BTEX compounds have taken place within the VW's estimated 100-foot treatment radius.

2.3.3.3 Respiration Test Results

Observed *in situ* microbial respiration (oxygen utilization) rates have decreased significantly as a result of pilot-scale bioventing system operation at Site ST-001. As can be seen from the results presented in Table 2.4, significant reductions occurred in both respiration and fuel biodegradation rates following the first year of system operation. Average 1-year respiration rates measured 4 to 14 percent of the initial values. Similar reductions also are evident in calculated fuel biodegradation rates for the site. Oxygen utilization and fuel biodegradation rates typically decrease with continued bioventing as the lighter, more readily biodegraded hydrocarbons are preferentially destroyed over more biologically recalcitrant, higher-molecular-weight hydrocarbons. As demonstrated by the soil gas results presented in Table 2.3, the BTEX compounds have been almost completely biodegraded.

2.3.4 1996 Williams Engineering, Inc. Groundwater Sampling

In July 1996, Williams Engineering, Inc. (Williams, 1996) collected groundwater samples from wells GMW-1 through 4, GMW-44, and GMW-45, for laboratory analysis. As can be seen from the results presented in Table 2.2, BTEX compounds were detected in groundwater samples from wells GMW-3, GMW-4, and GMW-44. Benzene, detected at a concentration of 37.3 µg/L in the sample from GMW-44, exceeded the ADEM benzene CAL of 5 µg/L. The specific benzene concentration from the sample collected at GMW-4 could not be accurately quantified; however, an ethylbenzene concentration of 1,820 µg/L and a toluene concentration of 7,210 µg/L exceeded the respective ADEM CALs of 700 µg/L and 1,000 µg/L. From this investigation, the maximum downgradient extent of dissolved BTEX contamination was estimated to be approximately 250 feet downgradient from the former USTs (Williams, 1996).

TABLE 2.3
INITIAL AND 1-YEAR SOIL GAS FIELD AND LABORATORY ANALYTICAL RESULTS
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Sampling Location ^a	Sampling Event ^b	Field Screening Data			Laboratory Analytical Data ^c					
		Oxygen (percent)	Carbon Dioxide (percent)	TVH ^d (ppmv) ^e	TVH (ppmv)	Benzene (ppmv)	Toluene (ppmv)	Ethylbenzene (ppmv)	Xylenes (ppmv)	
VW	Initial	3.8	4.5	10,800	21,000	190	360	160	480	
	1-Year	19.5	0.8	9	— ^f	—	—	—	—	
MPA-10	Initial	18.0	1.2	5,600	—	—	—	—	—	
	1-Year	17.5	1.0	12	—	—	—	—	—	
MPA-15	Initial	1.0	7.7	8,000	15,000	140	130	170	400	
	1-Year	20.0	0.8	30	48	<0.002 ^g	0.041	0.12	0.52	
MPA-19	Initial	0.0	8.0	12,000	22,000	200	170	98	250	
	1-Year	15.0	3.5	8	25	<0.002	0.098	0.12	0.46	
MPB-10	Initial	11.0	3.0	4,000	—	—	—	—	—	
	1-Year	18.5	1.5	25	10	<0.002	0.059	0.051	0.10	
MPB-14	Initial	0.5	7.8	1,240	—	—	—	—	—	
	1-Year	19.0	0.8	12	—	—	—	—	—	
MPB-18	Initial	1.4	4.9	2,200	—	—	—	—	—	
	1-Year	19.5	0.8	7	—	—	—	—	—	
MPC-10	Initial	17.0	0.7	780	290	<0.011	0.160	0.014	0.011	
	1-Year	—	—	—	—	—	—	—	—	
MPC-14	Initial	5.8	4.1	480	97	<0.004	0.005	<0.004	0.006	
	1-Year	19.0	1.0	19	5.2	<0.002	0.044	0.052	0.084	
MPC-18	Initial	6.0	4.1	520	160	<0.006	0.019	0.018	0.028	
	1-Year	20.0	0.5	5	—	—	—	—	—	
GMW-1	Initial	10.0	5.0	280	—	—	—	—	—	
	1-Year	20.0	1.0	60	—	—	—	—	—	
GMW-45	Initial	10.5	5.5	94	—	—	—	—	—	
	1-Year	20.0	2.0	15	—	—	—	—	—	

^a Sampling location identifies the monitoring point and depth in feet below ground surface.

^b Soil gas sampling performed in September 1995 (initial event) and October 1996 (1-year event).

^c TVH = total volatile hydrocarbons.

^d ppmv = parts per million, volume per volume.

^e Laboratory analysis of soil gas performed using USEPA Method TO-3. Laboratory TVH referenced to a molecular weight of 156 grams per mole.

^f — = not analyzed.

^g < = analyte concentration is less than the laboratory reporting limit shown.

TABLE 2.4
INITIAL AND 1-YEAR RESPIRATION AND FUEL BIODEGRADATION RATES
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Location-Depth ^{a/}	Initial (September 1995)		1-Year (October 1996)	
	Respiration Rate (% oxygen/hour)	Degradation Rate ^{b/} (mg/kg/year) ^{c/}	Respiration Rate (% oxygen/hour)	Degradation Rate ^{b/} (mg/kg/year) ^{c/}
VW-13-18	0.17	630	NM ^{d/}	NC ^{d/}
MPA-15	0.16	590	0.023	110
MPA-19	0.14	540	0.0051	24
MPB-10	NM	NC	0.0058	31

^{a/} Location-Depth gives screened interval location and depth in feet below ground surface.

^{b/} Initial and 1-year degradation rates based on moisture content of the soil during initial sampling. 1-year soil sampling was not performed.

^{c/} Milligrams of hydrocarbons per kilogram of soil per year.

^{d/} NM = not measured.

^{e/} NC = not calculated.

2.3.5 Results Summary

2.3.5.1 Soil

Soil sample results from the 1991 through 1995 investigations indicated the highest concentrations of TRPH and other fuel-related hydrocarbons occurred in vadose zone soils in the immediate vicinity of the former UST. Figure 2.3 shows the estimated extent of TRPH soil contamination at Site ST-001 that originally exceeded the ADEM CAL of 100 mg/kg. Based on the 1991, 1994, and 1995 investigations, soil contamination appeared to exceed regulatory requirements in the area circumscribed by GMW-1 through GMW-4, and as a result, a bioventing pilot-scale system was installed near the former UST location.

Initial and 1-year bioventing pilot test results indicate the effective treatment area of the bioventing system encompasses the entire area of contaminated soil identified on Figure 2.3. Significant reductions in TVH and BTEX soil gas concentrations and in oxygen utilization and fuel biodegradation rates following 1 year of bioventing are evident (Tables 2.3 and 2.4). Based on this information, TRPH concentrations in vadose zone soils at Site ST-001 are expected to be less than the CAL of 100 mg/kg; based on this expectation, AFCEE recommended that planning for confirmation sampling be initiated while the bioventing pilot-scale system continues to operate.

2.3.5.2 Groundwater

Dissolved benzene, toluene, and ethylbenzene concentrations in groundwater have exceeded ADEM (1995) criteria during 1991, 1994, and 1996 sampling events. BTEX concentrations from groundwater samples collected in 1996 from GMW-4 and GMW-44 indicate downgradient contaminant plume migration has occurred (Figure 2.3); dissolved BTEX contamination is estimated to extend approximately 250 feet downgradient from the former USTs (Williams, 1996). There is no indication that floating free product has been present on groundwater at the site, nor is there evidence of a significant smear zone from which chemicals of concern could continue to partition to groundwater. One-year bioventing pilot test results strongly indicate that petroleum contamination present in source area soils has been substantially reduced, and as a result, the extent of the dissolved plume is now thought to be stable, or decreasing.

Elevated levels of lead and trace levels of PAHs and VOCs have been detected in groundwater during previous investigations. Lead and PAH contamination of groundwater is likely to be the result of gasoline and/or diesel fuel releases from the original USTs. The source of VOCs detected at well GMW-45 is unknown. Based on information available from previous site investigations and from personnel at Maxwell AFB, no solvents or other sources of VOCs are known to exist at the former Building 408 site.

SECTION 3

SITE CLEANUP REQUIREMENTS

3.1 SITE CHARACTERIZATION REQUIREMENTS

The objective of the confirmatory soil and groundwater sampling is to support an NFRAP recommendation for the soils and groundwater contaminated by diesel fuel and/or gasoline in the vicinity of the former USTs, pursuant to closure of Site ST-001. This SAP targets unsaturated soils and groundwater in the vicinity of the former USTs, and groundwater immediately downgradient from the site.

3.2 STATE SOIL AND GROUNDWATER CLEANUP STANDARDS

ADEM currently allows evaluation of fuel hydrocarbon contaminants in soil and groundwater by established generic CALs, or by site-specific alternative corrective action limits (ACLs). The ACLs are established by conducting a site-specific risk-based evaluation to determine threats to potential receptors. The procedure for establishing the ACLs is currently reviewed on a site-by-site basis until such time as ADEM finalizes its RBCA program.

The forthcoming ADEM RBCA program will be a tiered, risk-based approach for clean up of petroleum-hydrocarbon-contaminated sites that is similar to the American Society for Testing and Materials (ASTM, 1995) RBCA decision-making process and AFCEE (1996) RBCA strategy. This iterative approach allows first for screening of contaminant concentrations against generic risk-based concentrations, followed by the development of site-specific cleanup criteria based on an analysis of site data and receptors that could potentially be exposed to chemical contamination at, or downgradient from, the release site. For the purpose of this SAP, it is assumed that the forthcoming RBCA standards being developed will be used by ADEM to evaluate the site. The ADEM RBCA program is anticipated to be finalized in Spring/Summer 1997. In the event that the new ADEM RBCA criteria are not available following site confirmation soil and groundwater sampling (Section 4) and prior to formation of the confirmation sampling report (Section 5), Parsons ES and Maxwell AFB will seek guidance from ADEM as to the appropriate course of action.

It is expected that forthcoming ADEM RBCA criteria will require an evaluation of BTEX and possibly other fuel contaminant (e.g., PAHs and lead) concentrations in soil and groundwater, given the likelihood that both diesel fuel and gasoline were released at Site ST-001. Because RBCA criteria are based on current or foreseeable land uses and human receptor exposure scenarios, a review of available information is provided below.

3.2.1 Land Use and Potential Receptors

Current land use adjacent to the site is commercial and residential. Housing is located north and east (upgradient) of Site ST-001. Vacant land and office buildings are located south and west (downgradient) of the site. Future land use for Site ST-001 has not been established, but would likely be industrial or commercial. For purposes of discussion and comparison, residential land use scenarios also are presented below as a very conservative estimate of future land use. Additional research into current zoning and future land use plans will be conducted under this work plan to refine the potential receptors that could be exposed to site related contaminants.

Based on these land use assumptions and the site description presented in Section 2, current and future onsite workers are likely to represent the primary human receptor population. However, residential populations also may represent a conservative potential future receptor if plume migration continues downgradient from the original source area (USTs), and if future residential development occurs in downgradient areas. No ecological receptors are likely to be exposed to contaminants in site media under current or anticipated future land uses.

Currently there is no on-Base beneficial use of groundwater from the shallow aquifer. Gunter Annex obtains its drinking water from the local municipality. As a result, exposure of onsite and off-site human receptors to site contaminants through ingestion of, inhalation of, or dermal contact with contaminants in groundwater extracted for potable use is unlikely. Soil sample results from previous investigations (Table 2.1) indicate that soil contamination appears to be significant only within soils located greater than 5 feet bgs (Table 2.1).

Based on this information, it is anticipated that the most significant contaminant migration pathway resulting from soil contamination at Site ST-001 is the leaching of contaminants from soil to groundwater. Volatilization of fuel hydrocarbons from soil and/or groundwater and vapor migration into onsite or off-site structures is expected to be the most significant exposure pathway resulting from contamination at Site ST-001.

3.2.2 Cleanup Criteria

3.2.2.1 Corrective Action Levels

The current ADEM CAL for petroleum contaminated soils is related to TRPH rather than BTEX or PAH contamination. Considering the TRPH concentrations detected in site soils prior to air injection bioventing (Table 2.1), the site is likely to now meet the current TRPH CAL of 100 mg/kg; however, new RBCA criteria are likely to require an evaluation of the individual petroleum hydrocarbons that pose the greatest risk to potential receptors in the vicinity of the site.

3.2.2.2 Potential ADEM RBCA Criteria

Based on the assumption that the forthcoming ADEM RBCA program will resemble the tiered approach outlined by ASTM (1995), ADEM will develop or adopt generic screening-level concentrations to support Tier 1 analysis and identification of chemicals

of potential concern (COPCs). The screening-level target concentrations will likely resemble the Tier 1 Risk-Based Screening Levels (RBSLs) presented in the ASTM (1995) look-up table. BTEX and other common petroleum contaminant (e.g., PAH and lead) concentrations in soil and groundwater at Site ST-001 will be determined in accordance with Section 4, in order to compare these values with ADEM screening-level concentrations. From this comparison, if the detected site contaminant concentrations do not exceed the most stringent respective screening-level target concentrations or RBSLs, the compounds will not be considered COPCs, and will not be retained for further Tier 2 evaluation. Under these circumstances, no additional remediation would be warranted for such compounds in order to protect human and ecological receptors. If a detected site contaminant exceeds the appropriate screening-level concentration, the compound is identified as a COPC and retained for further quantitative fate and transport and risk analyses. While an estimation of the ADEM Tier 2 process would be premature, an example Tier 1 evaluation presented below demonstrates that collection of soil and groundwater confirmation samples at Site ST-001 is warranted.

For the purpose of comparison, generic screening-level concentrations for both commercial/industrial and residential land use and maximum TRPH, BTEX, and lead soil concentrations detected during previous site investigations (Section 2.3) are presented in Table 3.1. Table 3.2 presents similar data for groundwater. The generic screening-level concentrations shown are from the ASTM (1995) *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* and the US Environmental Protection Agency (USEPA, 1996) *Soil Screening Guidance: Technical Background Document*. As previously mentioned, leaching of hydrocarbon contaminants from soil to groundwater and volatilization of contaminants from groundwater and vapor intrusion to buildings are likely to represent the most significant contaminant migration and exposure pathways represented by soil and groundwater contamination, respectively. Inhalation of VOCs in indoor air is considered the most likely exposure route.

As can be seen on Table 3.1, the only detected soil contaminant exceeding any of the estimated future risk-based screening concentrations is ethylbenzene. The soil leaching screening level (SSL) of 0.7 mg/kg for ethylbenzene assumes that no dilution or attenuation has occurred between the original source area and the receptor exposure point. This screening level is likely to be extremely conservative. While not readily apparent, benzene concentrations from the 1995 soil sampling event also may have exceeded the ASTM residential leachability RBSL and the USEPA groundwater migration SSLs because the analytical method detection limit shown is higher than these target screening levels. However, following more than 1.5 years of air injection bioventing, residual petroleum hydrocarbon contamination in soil is likely to be less than forthcoming ADEM screening-level concentrations.

The estimated risk-based criteria for groundwater shown in Table 3.2 represent dissolved concentrations of BTEX and naphthalenes that potentially could cause adverse indoor air concentrations resulting from contaminant vapor intrusion. These values represent a worst-case scenario, as no buildings currently are located directly above the area affected by the contaminant plume (Figure 2.3). Dissolved benzene, toluene, and ethylbenzene concentrations in groundwater samples from 1996 exceed their current

TABLE 3.1
SOIL CONTAMINANT LEVELS COMPARED TO EXISTING
AND ESTIMATED FUTURE RISK-BASED CLEANUP CRITERIA

SITE ST-001

GUNTER ANNEX, MAXWELL AFB, ALABAMA

Units ^e	Detected Site Maximum Concentration	Current ADEM CAL ^d	ASTM ^b		USEPA ^b			
			Residential Leachability RBSL ^f	Comm/Indus Leachability RBSL ^f	Ingestion SSL	Inhalation SSL	Groundwater Migration SSL (20 DAF) ^g	Groundwater Migration SSL (1 DAF) ^h
TRPH	mg/kg	1,117	NA ⁱ	NA	NA	NA	NA	NA
Benzene	mg/kg	<0.05 ^j	0.0172	0.0578	22	0.8	0.03	0.002
Toluene	mg/kg	0.38	129	361	16,000	650	12	0.6
Ethylbenzene	mg/kg	1.1	575	1,610	7,800	400	13	0.7
Xylenes	mg/kg	7.5	RES ^k	RES	160,000 ^l	410 ^m	190 ⁿ	9 ^o
Naphthalenes	mg/kg	— ^m	22.9	64.2	3,100	NA	84	4
Lead	mg/kg	11.1	NA	NA	400 ⁿ	— ⁿ	— ⁿ	— ⁿ

Note: The corrective action limits or target concentrations exceeded by the maximum site concentration detected are shown in gray.

^a Risk-based screening levels (RBSLs) from Table X2.1 (ASTM, 1995).

^b Generic soil screening levels (SSLs) from Table A-1 (USEPA, 1996).

^c mg/kg = milligrams per kilogram.

^d ADEM (1995) corrective action limits.

^e Values shown represent example Tier 1 Risk-Based Screening Levels (RBSLs) for residential receptor scenario considering soil-leachate to protect groundwater ingestion target level (ASTM, 1995).

^f Values shown represent example Tier 1 Risk-Based Screening Levels (RBSLs) for commercial/industrial receptor scenario considering soil-leachate to protect groundwater ingestion target level (ASTM, 1995).

^g Generic SSL values for the migration to groundwater pathway developed using a default dilution-attenuation factor (DAF) of 20 to account for natural processes that reduce contaminant concentrations in the subsurface.

^h Generic SSLs for the migration to groundwater pathway developed assuming no dilution or attenuation between the source and the receptor well (i.e., DAF = 1). Note that the 20 DAF values are not exactly 20 times the 1 DAF values because each SSL is calculated independently with the final value rounded to two significant figures for values greater than 10, and one significant figure if the value is less than 10.

ⁱ Target data concentrations not available in the sources which are referenced.

^j < = analyte concentration less than laboratory reporting limit shown.

^k RES = Selected risk level is not exceeded for pure compound present at any concentration (ASTM, 1995).

^l SSL data provided is for o-Xylene which has the most conservative SSLs of the three xylene isomers.

^m — = no site data yet available for this analyte.

ⁿ USEPA has set a screening level of 400 mg/kg for lead based on the Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities (1994).

TABLE 3.2
GROUNDWATER CONTAMINANT LEVELS COMPARED TO EXISTING
AND ESTIMATED FUTURE RISK-BASED CLEANUP CRITERIA

SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

	Units ^{b/}	Detected Site Maximum Concentration	Current ADEM CAL ^{c/}	ASTM ^{d/}	
				Residential Vapor Intrusion RBSL ^{d/}	Comm/Indus Vapor Intrusion RBSL ^{e/}
Benzene	µg/L	290 ^{f/}	5	23.8	73.9
Toluene	µg/L	7,210	1,000	32,800	85,000
Ethylbenzene	µg/L	1,820	700	77,500	>S ^{g/}
Xylenes	µg/L	8,020	10,000	>S	>S
Naphthalenes	µg/L	218 ^{h/}	NA ^{i/}	4,740	12,300
Lead	µg/L	78	15 ^{j/}	NA	NA

Note: The corrective action limits or target concentrations exceeded by the maximum site concentration detected are shown in gray.

^{a/} Risk-based screening levels (RBSLs) from Table X2.1 (ASTM, 1995).

^{b/} µg/L = micrograms per liter.

^{c/} ADEM (1995) corrective action limits.

^{d/} Values shown represent example Tier 1 Risk-Based Screening Levels (RBSLs) for residential receptor scenario considering vapor intrusion from groundwater to buildings (ASTM, 1995).

^{e/} Values shown represent example Tier 1 Risk-Based Screening Levels (RBSLs) for commercial/industrial receptor scenario considering vapor intrusion from groundwater to buildings (ASTM, 1995).

^{f/} July 1996 sample result from GMW-4 had a method detection limit of 500 µg/L, and as a result, the actual groundwater concentration from this sampling event may have been higher than the 1991 concentration shown.

^{g/} >S = selected risk level is not exceeded for all possible dissolved levels (less than or equal to solubility of pure component) (ASTM, 1995).

^{h/} Value shown represents the sum of naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene groundwater concentrations from the GMW-4 1991 sample results.

^{i/} Target data concentrations not available in the sources which are referenced.

^{j/} Represents the action level for lead in drinking water.

CALs; however, fuel contaminant concentrations in groundwater do not exceed generic ASTM (1995) RBSLs. As can be seen from Tables 2.2 and 3.2, dissolved lead concentrations at GMW-1, GMW-3, and GMW-4 all exceed the federal 15- $\mu\text{g/L}$ action level for lead in drinking water. Because current drinking water sources in the vicinity of Site ST-001 are not threatened by existing groundwater contamination, lead concentrations in shallow groundwater do not pose a risk to ecological or human receptors.

3.3 NATURAL ATTENUATION OF DISSOLVED FUEL CONTAMINANTS

An accurate estimate of the potential for natural biodegradation of BTEX compounds in groundwater is important to consider when determining whether fuel hydrocarbon contamination presents a substantial continuing threat to human health and the environment, and when deciding what type of remedial alternative will be most cost effective in eliminating or abating these threats. Over the past two decades, numerous laboratory and field studies have demonstrated that subsurface microorganisms can degrade a variety of hydrocarbons (Lee, 1988). This process occurs naturally when sufficient oxygen (or other electron acceptors) and nutrients are available in the groundwater. The rate of natural biodegradation is generally limited by the lack of oxygen (or other electron acceptors) rather than by the lack of nutrients such as nitrogen or phosphorus. The supply of oxygen to unsaturated soil is constantly renewed by vertical diffusion from the atmosphere. The supply of oxygen to a shallow, fuel-contaminated aquifer is constantly renewed by the influx of oxygenated, upgradient flow and recharge from precipitation and by the vertical diffusion of oxygen from the unsaturated soil zone into the groundwater (Borden and Bedient, 1986). The rate of natural biodegradation in unsaturated soil and shallow aquifers is largely dependent upon the types and degree of weathering of the contaminants present, and the rates at which oxygen and other electron acceptors enter the contaminated media.

The positive effect of natural attenuation processes (e.g., advection, dispersion, sorption, and biodegradation) on reducing the actual mass of fuel-related contamination dissolved in groundwater has been termed remediation by natural attenuation (RNA). To estimate the impact of natural attenuation on the fate and transport of BTEX compounds dissolved in groundwater at a site, two important lines of evidence should be demonstrated (Wiedemeier *et al.*, 1995). The first is a documented loss of contaminants at the field scale. One way to show loss of contaminant mass is to use historical monitoring data to show that plume concentrations and extents decrease or remain constant over time. At some sites, dissolved concentrations of biologically recalcitrant tracers found in most fuel contamination can be used in conjunction with aquifer hydrogeologic parameters, such as groundwater seepage velocity and dilution, to demonstrate that a reduction in contaminant mass is occurring. The second line of evidence involves the use of geochemical data in mass-balance calculations to show that areas with BTEX contamination can be correlated to areas with depleted electron acceptor (e.g., oxygen, nitrate, and sulfate) concentrations and increases in metabolic fuel degradation byproduct concentrations (e.g., methane and ferrous iron). With this site-specific information, groundwater flow and solute transport data can be used to estimate the extent of RNA occurring in site groundwater. Natural chemical attenuation of dissolved fuel hydrocarbon contaminants also may be occurring at Site

ST-001. The additional time required, if any, for groundwater contamination throughout the plume to be reduced to below cleanup target levels cannot be estimated until the ADEM RBCA procedures and cleanup goals are finalized and additional groundwater data are collected.

SECTION 4

SITE CONFIRMATION SOIL AND GROUNDWATER SAMPLING AND ANALYSIS PLAN

The following SAP describes the sampling locations and procedures, and the analytical methods proposed to collect sufficient data to verify remediation of Site ST-001 soils and groundwater to ADEM cleanup levels, to determine the extent to which natural attenuation processes are reducing contaminant mass in groundwater, and to support site closure. Sampling and laboratory testing will follow the procedures and analytical methods presented in the ADEM (1995) *Alabama Underground Storage Tank Release Investigation and Corrective Action Guidance Manual*.

As described in Section 2, soil contamination at Site ST-001 was characterized during the 1991 through 1996 investigations. Based on results from these investigations, petroleum hydrocarbon contamination exceeding the ADEM (1995) TRPH CAL of 100 mg/kg (prior to initiation of *in situ* bioventing) appear to have been confined to vadose zone soils between 5 and 25 feet bgs and circumscribed by GMW-1, GMW-2, GMW-3, and GMW-4. To confirm that petroleum hydrocarbon contaminants in site soils have been remediated to within acceptable levels, Parsons ES proposes to drill and sample in the vicinity of the former USTs and within the area of previously identified TRPH CAL exceedances (Figure 2.3).

Groundwater concentrations of benzene, toluene, and ethylbenzene exceeded ADEM (1995) CALs in samples collected in 1991, 1994, and 1996 and exceeded criteria for lead in samples collected in 1991. The maximum downgradient extent of detectable dissolved BTEX contamination was estimated to be approximately 250 feet downgradient from the former USTs (Williams, 1996). To determine any changes in the concentrations of the dissolved BTEX contamination plume, groundwater samples for laboratory analysis will be collected from the three crossgradient or downgradient wells previously demonstrating BTEX contamination (GMW-3, GMW-4, and GMW-44), and from one upgradient well (GMW-45). Groundwater samples from these wells and from wells GMW-1 and GMW-2 will be analyzed for BTEX, PAHs, and lead. Samples from these wells also will be analyzed for VOCs due to their presence in trace amounts during the 1994 sampling conducted by Benchmark Engineering (Table 2.2). In addition, samples from these six wells will be collected and analyzed onsite for various geochemical parameters including electron acceptors. Lastly, groundwater samples from a source area well (GMW-4) and an upgradient well (GMW-45) will be collected for laboratory methane analysis. The geochemical/electron acceptor data will be used to assess whether or not natural biodegradation of BTEX compounds is occurring in the groundwater and to assess the groundwater assimilative

capacity for natural chemical attenuation of the remaining concentrations of petroleum hydrocarbon compounds.

4.1 SOIL SAMPLING

This section describes the scope of work required for collecting confirmation soil samples at Site ST-001. An estimated eight boreholes will be drilled and sampled within the area where TRPH results exceeded the ADEM CAL of 100 mg/kg in 1994 and 1995. A maximum of two additional boreholes may be drilled and sampled if field screening results indicate significant contamination extending beyond the proposed sampling area. Proposed borehole locations are shown on Figure 4.1.

Soil sampling will be conducted by qualified Parsons ES scientists and technicians trained in the conduct of soil sampling, records documentation, and chain-of-custody procedures. In order to provide complete documentation of the sampling event, detailed records will be maintained by the Parsons ES field hydrogeologist. In addition, sampling personnel will have thoroughly reviewed this SAP prior to sample collection and will have a copy available onsite for reference.

4.1.1 Drilling, Sampling, and Equipment Decontamination

Boreholes will be advanced using a drill rig equipped with 2.5- or 3.25-inch inside-diameter (ID) hollow-stem augers. Augers and other downhole equipment will be cleaned before use and between boreholes to prevent cross-contamination. Cleaning will be accomplished using a high-pressure, hot-water wash, followed by a potable water rinse. Decontamination will be performed at the site, and decontamination fluids will be discharged on the ground surface adjacent to each borehole. Drill cuttings will be managed as described in Section 4.5. Boreholes not backfilled with clean cuttings will be abandoned using cement/bentonite grout following drilling and sampling. The grout mixture will contain a maximum of 5 percent bentonite.

Boreholes will be drilled to 2 feet below the groundwater table surface; total borehole depths are expected to be between 20 and 27 feet bgs. Relatively undisturbed soil samples, suitable for chemical analysis, will be collected from the ground surface to total depth at approximately 5-foot intervals. Soil types will be classified according to the Unified Soil Classification System (USCS) and described in accordance with the standard Parsons ES soil description format. All soil samples will be visually examined and field analyzed using a photoionization detector (PID) or a total volatile hydrocarbon analyzer (TVHA). Based on field screening results, two samples with the greatest apparent contamination from each boring will be selected and submitted for laboratory analysis of TRPH, PAHs, BTEX, and lead.

Soil samples will be collected in a standard split-barrel sampler that will be lowered through the hollow stem of the augers and driven approximately 1.5 feet ahead of the augers into undisturbed soil. Between sampling events, the split-barrel sampler will be cleaned with Alconox[®] detergent, followed by successive potable and distilled water rinses.

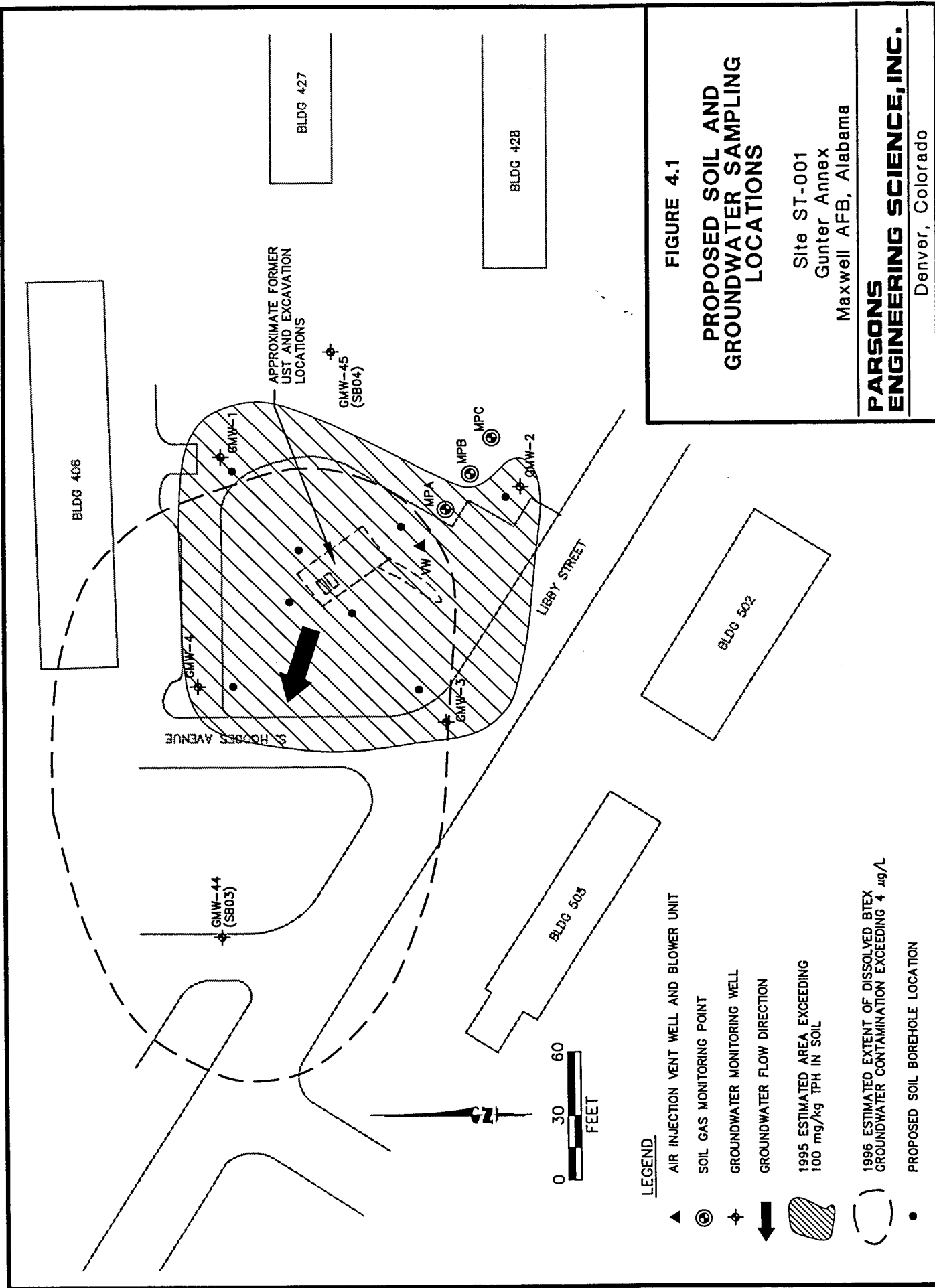


FIGURE 4.1
PROPOSED SOIL AND
GROUNDWATER SAMPLING
LOCATIONS

Site ST-001
 Gunter Annex
 Maxwell AFB, Alabama

PARSONS
ENGINEERING SCIENCE, INC.
 Denver, Colorado

The split-barrel sampler will be fitted with three precleaned, 6-inch-long, thin-walled, brass sleeves. Before samples are collected, sample sleeves will be cleaned using the same procedure as that described for the sampler. After collection of a sample, the sampler will be retrieved, split apart, and the sleeves will be removed. In preparation for laboratory submittal, the ends of the lowest (i.e., deepest) brass sleeve will be covered with Teflon[®] sheets and plastic end caps.

The upper (i.e., shallower) sample sleeves will be used for geologic logging and will be screened in the field for organic vapors using a PID or a THVA. The data obtained from the logging and screening will be recorded on the borehole logs. The sleeves selected for laboratory analysis will be labeled with the site name and borehole number, sample depth, date of collection, project name, and other pertinent data. These sleeves will be sealed in plastic bags and immediately placed in an insulated cooler containing ice. The soil samples will be maintained in a chilled condition until delivered to the analytical laboratory. Chain-of-custody records will be prepared in the field and will accompany the samples to the analytical laboratory.

4.1.2 Soil Sample Analyses

Proposed soil sample analytical methods, estimated number of samples, and reporting limits are presented in Table 4.1. All samples will be analyzed by a State of Alabama-certified and AFCEE-approved laboratory. Parsons ES proposes to analyze samples from Site ST-001 for TRPH by US Environmental Protection Agency (USEPA) Method SW8015, modified for diesel- and gasoline-range organics; for BTEX by USEPA Method SW8020; for PAHs by USEPA Method SW8310; and for lead by USEPA Method SW7421. Quality control (QC) samples also will be analyzed to assess laboratory methods. The laboratory will perform analyses on one matrix spike, one laboratory control, and one laboratory blank for each specific analytical method requested.

4.2 GROUNDWATER SAMPLING

This section describes the scope of work required for collecting groundwater samples at existing groundwater monitoring wells for both field and laboratory analysis. Samples from six existing wells (GMW-1, GMW-2, GMW-3, GMW-4, GMW-44, and GMW-45) will be sent to the laboratory for BTEX, VOC, PAH, and lead analyses. Samples from these six wells also will be analyzed in the field for electron acceptors and other geochemical parameters to assess the degree of natural chemical attenuation occurring in groundwater at the site. Lastly, samples from two wells, one in the source area (GMW-4) and one upgradient (GMW-45), will be collected for laboratory methane analysis. The proposed groundwater sampling locations are shown on Figure 4.1 and the groundwater analyses to be performed are shown in Table 4.2.

As with soil sampling, groundwater sampling will be conducted by qualified Parsons ES scientists and technicians trained in the conduct of well sampling. Groundwater sampling will be performed in accordance with the procedures outlined in this SAP.

TABLE 4.1
PROPOSED SOIL SAMPLE ANALYTICAL METHODS,
REPORTING LIMITS, AND NUMBER OF SAMPLES
SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Analytical Method	Number of Samples ^a	Reporting Limit ^b	Units ^c	Field or Fixed-Base Laboratory
USEPA Method SW8015 Modified				
Diesel-Range Organics	16	10	mg/kg	Fixed-base
Gasoline-Range Organics	16	1	mg/kg	Fixed-base
USEPA Method SW8020				
Benzene	16	1.0	µg/kg	Fixed-base
Toluene	16	2.0	µg/kg	Fixed-base
Ethylbenzene	16	2.0	µg/kg	Fixed-base
Xylenes	16	2.0	µg/kg	Fixed-base
USEPA Method SW8310				
Acenaphthene	16	1,200	µg/kg	Fixed-base
Acenaphthylene	16	1,540	µg/kg	Fixed-base
Anthracene	16	440	µg/kg	Fixed-base
Benzo(a)anthracene	16	9	µg/kg	Fixed-base
Benzo(a)pyrene	16	15	µg/kg	Fixed-base
Benzo(a)fluoranthene	16	12	µg/kg	Fixed-base
Benzo(g,h,i)perylene	16	50	µg/kg	Fixed-base
Benzo(k)fluoranthene	16	11	µg/kg	Fixed-base
Chrysene	16	100	µg/kg	Fixed-base
Dibenzo(a,h)anthracene	16	20	µg/kg	Fixed-base
Fluoranthene	16	140	µg/kg	Fixed-base
Fluorene	16	140	µg/kg	Fixed-base
Indeno(1,2,3-cd)pyrene	16	30	µg/kg	Fixed-base
Naphthalene	16	1,200	µg/kg	Fixed-base
Phenanthrene	16	420	µg/kg	Fixed-base
Pyrene	16	180	µg/kg	Fixed-base
USEPA Method SW7421				
Lead	16	500	µg/kg	Fixed-base

^a Excludes QC samples. If optional boreholes are required, two additional soil samples per optional borehole also will be collected and analyzed.

^b Project reporting limit as specified in subcontract for analytical services.

^c mg/kg = milligrams per kilogram; µg/kg = micrograms per kilogram.

TABLE 4.2
PROPOSED GROUNDWATER SAMPLE ANALYTICAL METHODS,
REPORTING LIMITS, AND NUMBER OF SAMPLES

SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Analytical Method	Number of Samples ^{a/}	Reporting Limit ^{b/}	Units ^{c/}	Field or Fixed-Base Laboratory
USEPA Method SW8260A				
1,1,1,2-Tetrachloroethane	6	0.5	µg/L	Fixed-base
1,1,1-Trichloroethane	6	0.8	µg/L	Fixed-base
1,1,2,2-Tetrachloroethane	6	0.4	µg/L	Fixed-base
1,1,2-Trichloroethane	6	1.0	µg/L	Fixed-base
1,1-Dichloroethane	6	0.4	µg/L	Fixed-base
1,1-Dichloroethene	6	1.2	µg/L	Fixed-base
1,1-Dichloropropene	6	1.0	µg/L	Fixed-base
1,2,3-Trichlorobenzene	6	0.3	µg/L	Fixed-base
1,2,3-Trichloropropane	6	3.2	µg/L	Fixed-base
1,2,4-Trichlorobenzene	6	0.4	µg/L	Fixed-base
1,2,4-Trimethylbenzene	6	1.3	µg/L	Fixed-base
1,2-Dibromo-3-chloropropane (DBCP)	6	2.6	µg/L	Fixed-base
1,2-Dibromoethane (EDB)	6	0.6	µg/L	Fixed-base
1,2-Dichlorobenzene	6	0.3	µg/L	Fixed-base
1,2-Dichloroethane	6	0.6	µg/L	Fixed-base
1,2-Dichloropropane	6	0.4	µg/L	Fixed-base
1,3,5-Trimethylbenzene	6	0.5	µg/L	Fixed-base
1,3-Dichlorobenzene	6	1.2	µg/L	Fixed-base
1,3-Dichloropropane	6	0.4	µg/L	Fixed-base
1,4-Dichlorobenzene	6	0.3	µg/L	Fixed-base
1-Chlorohexane	6	0.5	µg/L	Fixed-base
2,2-Dichloropropane	6	3.5	µg/L	Fixed-base
2-Chlorotoluene	6	0.4	µg/L	Fixed-base
4-Chlorotoluene	6	0.6	µg/L	Fixed-base
Benzene	6	0.4	µg/L	Fixed-base
Bromobenzene	6	0.3	µg/L	Fixed-base
Bromochloromethane	6	0.4	µg/L	Fixed-base
Bromodichloromethane	6	0.8	µg/L	Fixed-base
Bromoform	6	1.2	µg/L	Fixed-base
Bromomethane	6	1.1	µg/L	Fixed-base
Carbon tetrachloride	6	2.1	µg/L	Fixed-base
Chlorobenzene	6	0.4	µg/L	Fixed-base
Chloroethane	6	1.0	µg/L	Fixed-base

TABLE 4.2 (Continued)
PROPOSED GROUNDWATER SAMPLE ANALYTICAL METHODS,
REPORTING LIMITS, AND NUMBER OF SAMPLES

SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Analytical Method	Number of Samples ^{a/}	Reporting Limit ^{b/}	Units ^{c/}	Field or Fixed-Base Laboratory
USEPA Method SW8260A (Continued)				
Chloroform	6	0.3	µg/L	Fixed-base
Chloromethane	6	1.3	µg/L	Fixed-base
cis-1,2-Dichloroethene	6	1.2	µg/L	Fixed-base
cis-1,3-Dichloropropene	6	NA ^{d/}	NA	Fixed-base
Dibromochloromethane	6	0.5	µg/L	Fixed-base
Dibromomethane	6	2.4	µg/L	Fixed-base
Dichlorodifluoromethane	6	1.0	µg/L	Fixed-base
Ethylbenzene	6	0.6	µg/L	Fixed-base
Hexachlorobutadiene	6	1.1	µg/L	Fixed-base
Isopropylbenzene	6	0.5	µg/L	Fixed-base
m-Xylene	6	0.5	µg/L	Fixed-base
Methylene Chloride	6	0.3	µg/L	Fixed-base
n-Butylbenzene	6	1.1	µg/L	Fixed-base
n-Propylbenzene	6	0.4	µg/L	Fixed-base
Naphthalene	6	0.4	µg/L	Fixed-base
o-Xylene	6	1.1	µg/L	Fixed-base
p-Isopropyltoluene	6	1.2	µg/L	Fixed-base
p-Xylene	6	1.3	µg/L	Fixed-base
sec-Butylbenzene	6	1.3	µg/L	Fixed-base
Styrene	6	0.4	µg/L	Fixed-base
tert-Butylbenzene	6	1.4	µg/L	Fixed-base
Tetrachloroethene	6	1.4	µg/L	Fixed-base
Toluene	6	1.1	µg/L	Fixed-base
trans-1,2-Dichloroethene	6	0.6	µg/L	Fixed-base
trans-1,3-Dichloropropene	6	NA	NA	Fixed-base
Trichloroethene	6	1.0	µg/L	Fixed-base
Trichlorofluoromethane	6	0.8	µg/L	Fixed-base
Vinyl chloride	6	1.1	µg/L	Fixed-base
USEPA Method SW8310				
Acenaphthene	6	18	µg/L	Fixed-base
Acenaphthylene	6	23	µg/L	Fixed-base
Anthracene	6	6.6	µg/L	Fixed-base

TABLE 4.2 (Continued)
PROPOSED GROUNDWATER SAMPLE ANALYTICAL METHODS,
REPORTING LIMITS, AND NUMBER OF SAMPLES

SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Analytical Method	Number of Samples ^{a/}	Reporting Limit ^{b/}	Units ^{c/}	Field or Fixed-Base Laboratory
USEPA Method SW8310 (Continued)				
Benzo(a)anthracene	6	0.1 ^{e/}	µg/L	Fixed-base
Benzo(a)pyrene	6	0.2 ^{e/}	µg/L	Fixed-base
Benzo(b)fluoranthene	6	0.18	µg/L	Fixed-base
Benzo(g,h,i)perylene	6	0.76	µg/L	Fixed-base
Benzo(k)fluoranthene	6	0.17	µg/L	Fixed-base
Chrysene	6	0.2 ^{e/}	µg/L	Fixed-base
Dibenzo(a,h)anthracene	6	0.3	µg/L	Fixed-base
Fluoranthene	6	2.1	µg/L	Fixed-base
Fluorene	6	2.1	µg/L	Fixed-base
Indeno(1,2,3-cd)pyrene	6	0.4 ^{e/}	µg/L	Fixed-base
Naphthalene	6	18	µg/L	Fixed-base
Phenanthrene	6	6.4	µg/L	Fixed-base
Pyrene	6	2.7	µg/L	Fixed-base
USEPA Method SW7421				
Lead	6	5	µg/L	Fixed-base
USEPA SW9056				
Sulfate	6	0.2	mg/L	Fixed-base
RSKSOP 175 ^{f/}				
Methane	2	NA	NA	Fixed-base
Hach Method 8000 Series ^{g/}				
Nitrate	6	---	---	Field
Nitrite	6	---	---	Field
Sulfide	6	---	---	Field
Ferrous Iron	6	---	---	Field
Manganese	6	---	---	Field

TABLE 4.2 (Continued)
PROPOSED GROUNDWATER SAMPLE ANALYTICAL METHODS,
REPORTING LIMITS, AND NUMBER OF SAMPLES

SITE ST-001
GUNTER ANNEX, MAXWELL AFB, ALABAMA

Analytical Method	Number of Samples ^{a/}	Reporting Limit ^{b/}	Units ^{c/}	Field or Fixed-Base Laboratory
Direct Reading Meter				
pH	6	---	---	Field
Conductivity	6	---	---	Field
Temperature	6	---	---	Field
Dissolved Oxygen	6	---	---	Field
Redox Potential	6	---	---	Field

^{a/} Excludes QC samples.

^{b/} Project reporting limit as specified in subcontract for analytical services.

^{c/} µg/L = micrograms per liter; mg/L = milligrams per liter.

^{d/} NA = not available.

^{e/} Number shown represents proposed or actual Federal maximum contaminant level (MCL) for groundwater. Laboratory reporting limits for these and all other analytes will be less than or equal to MCLs.

^{f/} National Risk Management Research Laboratory (formerly Robert S. Kerr Research Laboratory) Standard Operating Procedure for methane or equivalent.

^{g/} "Hach" refers to methods described in the Hach Company catalog, 1990.

4.2.1 Well Purging, Sample Collection, and Decontamination

This section describes the scope of work required for collecting groundwater samples at each of six existing groundwater monitoring wells. All water samples collected from groundwater monitoring wells will be obtained using either disposable bailers, decontaminated Teflon® bailers, or a thoroughly decontaminated peristaltic pump. In order to maintain a high degree of QC during this sampling event, the procedures described in the following sections will be followed.

4.2.1.1 Equipment Decontamination

All portions of sampling and test equipment that will contact the sample will be thoroughly cleaned before each use. This equipment includes the peristaltic pump and tubing, Teflon® bailers, water-level probe and cable, oil/water interface probe and cable, lifting line, test equipment for onsite use, and other equipment or portions thereof which will contact the samples. Based on the types of sample analyses to be conducted, the following decontamination protocol will be used:

- Clean with potable water and phosphate-free laboratory detergent;
- Rinse with potable water;
- Triple rinse with distilled or deionized water;
- Air dry the equipment prior to use.

If precleaned, dedicated sampling equipment is used, the decontamination protocol specified above will not be required. Laboratory-supplied sample containers will be cleaned and sealed by the laboratory.

4.2.1.2 Well Purging

Prior to removing any water from the well, the static water level will be measured. An electrical water level probe will be used to measure the depth to groundwater below the datum to the nearest 0.01 foot. After measuring the static water level, the water level probe will be lowered slowly to the bottom of the well, and the total well depth will be measured to the nearest 0.01 foot. Based on these measurements, the volume of water to be purged from the well can be calculated. The volume of water contained within the well casing at the time of sampling will be calculated, and three times the calculated volume will be removed from the well. The pH, temperature, and specific conductivity will be monitored before, during, and after well purging and recorded on well sampling forms. Purge water will be discharged onto the ground surface adjacent to the well from which it was removed.

4.2.1.3 Sample Extraction

Either disposable, polyethylene bailers, reusable Teflon® bailers, or a thoroughly decontaminated peristaltic pump will be used to extract groundwater samples from the

well. The extraction equipment will be lowered into the water gently to prevent splashing and extracted gently to prevent creation of excessive vacuum in the well. The sample will be transferred directly to the appropriate sample container. The water sample will be transferred from the bottom of the bailer using a bottom-emptying device to allow a controlled flow into the sample container. Water from the peristaltic pump can be directly discharged into the sample container. The water will be carefully poured down the inner walls of the sample bottle to minimize aeration of the sample. Unless other instructions are given by the analytical laboratory, sample containers will be completely filled so that no air space remains in the container.

4.2.2 Onsite Chemical Parameter Measurement

Many of the groundwater chemical parameters will be measured onsite by Parsons ES personnel (Table 4.2). Some of the measurements will be made using direct-reading meters, while others will be made using a Hach® portable colorimeter in accordance with specific Hach® analytical procedures. These procedures are described in the following subsections.

All glassware or plasticware used in the analyses will have been cleaned prior to sample collection by thoroughly washing with a solution of Alconox® and water, and rinsing with deionized water and ethanol to prevent interference or cross contamination between measurements. If concentrations of an analyte are above the range detectable by the titrimetric method, the analysis will be repeated by diluting the groundwater sample with double-distilled water until the analyte concentration falls to a level within the range of the method. All rinseate and sample reagents accumulated during field groundwater analysis will be discharged onto the ground surface at the site. Sample reagents to be used for field analysis are composed of innocuous salts and only a few grams of the reagents will be required.

4.2.2.1 Dissolved Oxygen Measurements

Dissolved oxygen (DO) is an important electron acceptor in the aerobic biodegradation of dissolved fuel hydrocarbons. DO measurements will be made using a meter with a downhole oxygen sensor or a sensor in a flow-through cell. Measurements will be taken before and following groundwater sample acquisition. When DO measurements are taken in monitoring wells that have not yet been sampled, the existing monitoring wells will be purged until DO levels stabilize. Measured values will be recorded in the groundwater sampling record.

4.2.2.2 pH, Temperature, and Specific Conductance

Because the pH, temperature, and specific conductance of a groundwater sample can change significantly within a short time following sample acquisition, these parameters will be measured in the field in unfiltered, unpreserved, "fresh" water collected by the same technique as the samples taken for laboratory analyses. The measurements will be made in a clean glass container separate from those intended for laboratory analysis, and the measured values will be recorded in the groundwater sampling record.

4.2.2.3 Other Electron Acceptor Measurements

Nitrate, nitrite, sulfate, and ferrous iron concentrations in groundwater act as potential electron acceptors for fuel hydrocarbon degradation under anaerobic conditions. These analytes will be measured by experienced Parsons ES scientists via colorimetric analysis using a Hach® portable colorimeter according to the appropriate Hach® methods (Table 4.2).

4.2.2.4 Reduction/Oxidation Potential

The oxidation/reduction (redox) potential of groundwater is an indicator of the relative tendency of a solution to accept or transfer electrons. Redox reactions in groundwater often are biologically mediated; therefore, the redox potential of a groundwater system depends upon and influences rates of biodegradation. Redox potentials can be used to provide real-time data on the location of the contaminant plume, especially in areas undergoing anaerobic biodegradation. The redox potential of a groundwater sample can change significantly within a short time following sample acquisition and exposure to atmospheric oxygen. Therefore, this parameter will be measured in the field in unfiltered, unpreserved, "fresh" water collected by the same technique as the samples taken for laboratory analyses. The measurements will be made as quickly as possible in a clean glass container separate from those intended for laboratory analysis.

4.2.3 Sample Handling

Sample containers and appropriate container lids will be provided by the laboratory. The laboratory will add any necessary chemical preservatives prior to shipping the containers to the site. The sample containers will be filled as described in Section 4.2.1.3, and the container lids will be tightly closed. The sample bottles will be labeled with the site name and well number, sample depth, date of collection, project name, and other pertinent data. Samples will be properly prepared for transportation to the laboratory by placing the samples in a cooler containing ice to maintain a shipping temperature of approximately 4 degrees centigrade (°C). Chain-of-custody records will be prepared in the field and will accompany the samples to the analytical laboratory.

4.2.4 Groundwater Analyses

Proposed groundwater sample analytical methods and laboratory reporting limits are presented in Table 4.2. All samples will be analyzed by a State of Alabama-certified and AFCEE-approved laboratory. Parsons ES proposes to analyze groundwater samples from Site ST-001 for BTEX and VOCs by USEPA Method SW8260; for PAHs by USEPA Method SW8310; for lead by USEPA Method SW7421; for sulfate by USEPA Method SW9056; and for methane by Robert S. Kerr Standard Operating Procedure (RSKSOP) 175 or equivalent. QC samples also will be analyzed to assess laboratory methods. The laboratory will perform analyses on one matrix spike, one laboratory control, and one laboratory blank for each specific analysis requested.

4.3 CHAIN-OF-CUSTODY CONTROL

After the samples for laboratory analysis have been collected, chain-of-custody procedures will be followed to establish a written record of sample handling and movement between the sampling site and the laboratory. Samples collected for onsite field analyses will not require chains-of-custody. Each shipping container will have a chain-of-custody form completed in triplicate by the sampling personnel. One copy of this form will be kept by the sampling contractor after sample delivery to the analytical laboratory, and the other two copies will be retained at the laboratory. One of the laboratory copies will become a part of the permanent record for the sample and will be returned with the sample analytical results. The chain-of-custody will contain the following information:

- Site name and address;
- Sample identification number;
- Sample collector's printed name and signature;
- Date and time of collection;
- Place and address of collection;
- Type of sample, i.e. composite, grab, etc.;
- Sample matrix (soil or groundwater);
- Chemical preservatives added;
- Analytical laboratory to be utilized;
- Analyses requested;
- Signatures of individuals involved in the chain of possession; and
- Inclusive dates of possession.

The chain-of-custody documentation will be placed inside the shipping container so that it will be immediately apparent to the laboratory personnel receiving the container, but will not be damaged or lost during transport. The shipping container will be sealed so that it will be obvious if the seal has been tampered with or broken.

4.4 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

Samples must be collected, preserved, transported, and analyzed in such a manner that sampling results yield information which provides a reliable representation of the soil and groundwater quality at the site. To meet this requirement, the procedures described in Sections 4.1 and 4.2 will be followed during sample collection, handling and analysis. In addition, laboratory QC samples will be analyzed as described in Sections 4.1.2 and 4.2.4.

Field QA/QC for groundwater and soil will include collection of field duplicates, rinseate blanks, and trip blanks. Groundwater QA/QC sampling will include one duplicate sample (minimum frequency of 10 percent), one rinseate blank, and one trip blank for each cooler with samples designated for VOC analysis. Soil QA/QC sampling will include two duplicates (minimum frequency of 10 percent), one rinseate blank, and one trip blank for each cooler with samples designated for VOC analysis.

4.5 MANAGEMENT OF INVESTIGATION-DERIVED WASTES

Soil cuttings generated during drilling will be screened with a PID or a TVHA. Those cuttings that exhibit staining, odor, or headspace readings above background levels will be placed in US Department of Transportation (DOT)-approved 55-gallon drums. The drums will be labeled with the site name, drilling date, borehole number, and depth intervals. The contaminated soil will be transported to the Maxwell AFB contaminated soil staging area and will be disposed of in accordance with the current procedures for ongoing remedial investigations at Maxwell AFB and Gunter Annex. To minimize cuttings disposal costs, cuttings showing no field evidence of contamination will either be replaced into the borehole from which they were generated or spread on the ground surface adjacent to each borehole.

SECTION 5

SITE CONFIRMATION SAMPLING REPORT FORMAT

Following receipt of the laboratory analytical results, a draft confirmation soil and groundwater sampling report will be prepared and submitted to ADEM, Maxwell AFB, and AFCEE.

The report will contain the following information for Site ST-001:

- Site plot plan showing sampling locations;
- Summary of field activities;
- Assessment of analytical results in comparison to applicable ADEM soil cleanup criteria for petroleum hydrocarbons, PAHs, lead, and BTEX;
- Assessment of analytical results in comparison to applicable ADEM groundwater cleanup criteria for PAHs, VOCs, lead, and BTEX;
- Assessment of the potential for RNA in groundwater;
- Evaluation of the applicability and anticipated effectiveness of using a bio-attenuation stimulant (i.e., oxygen release compound) to promote RNA aerobic degradation pathways;
- ADEM required information including ADEM site classification and groundwater monitoring forms, site-specific monitoring well elevation data (based on area benchmarks or topographic maps), and depth to groundwater (referenced to the tops of monitoring well casings or ground level);
- Laboratory analytical reports and chain-of-custody forms;
- Borehole logs; and
- Conclusions and recommendations for NFRAP and site closure, additional cleanup action, or continued groundwater monitoring .

SECTION 6

MAXWELL AFB SUPPORT REQUIREMENTS

The following Maxwell AFB support is needed prior to the arrival of the drillers and the Parsons ES team:

- Assistance in obtaining drilling and digging permits.
- Arrangement of Gunter Annex and site access for Parsons ES and the drilling subcontractor.
- Provision of a potable water supply for drilling and decontamination activities.
- Assistance in handling/disposal of contaminated soil cuttings, if encountered during drilling activities, in accordance with Section 4.5.

SECTION 7

PROJECT SCHEDULE

The following schedule is contingent upon approval of this confirmation SAP and fulfillment of the Maxwell AFB support requirements outlined in Section 6.

<u>Event</u>	<u>Date</u>
Submit Draft Confirmation SAP to AFCEE, and Maxwell AFB	28 March 1997
Receipt of AFCEE and Maxwell AFB Comments	8 April 1997
Submit Draft Final SAP to AFCEE, Maxwell AFB, and ADEM*	9 May 1997
Receipt of AFCEE, Maxwell AFB, and ADEM Comments, if any	6 June 1997
Submit Final SAP to AFCEE, Maxwell AFB, and ADEM, if necessary*	20 June 1997
Begin Confirmation Sampling	7 July 1997
Submit Draft Confirmation Sampling Report to AFCEE and Maxwell AFB	12 September 1997
Receipt of AFCEE and Maxwell AFB Comments	3 October 1997
Submit Draft Final Confirmation Sampling Report to AFCEE, Maxwell AFB, and ADEM	24 October 1997

* Copies of SAP for ADEM sent to Maxwell AFB for submittal.

SECTION 8

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SECTION 9

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APPENDIX B
BORING LOGS, GROUNDWATER SAMPLING FORMS

GEOLOGIC BORING LOG

BORING NO. SBC1
 CLIENT: AFCEE
 JOB NO.: 726876.24120
 LOCATION: Gunter Annex ST-001
 GEOLOGIST: J. Hall
 COMMENTS:

CONTRACTOR: CCI
 RIG TYPE: CME
 DRLG METHOD: HSA
 BORING DIA.: 4.5"
 DRLG FLUID: —

DATE SPUD: 7/8/97 09:15
 DATE CMPL: 7/8/97
 ELEVATION: NA
 TEMP.: 85-90°F
 WEATHER: P. Sunny

Elev. (ft.)	Depth (ft.)	Pro- file	US CS	Geologic Description	Samples		Sample Type	Penet. Res.	Remarks TIP = Bkgnd/Reading (ppm)
					No.	Depth (ft)			
	1		CL	CLAY, silty, brn., moist, tr sand no odor				3/4 1/6	0.8 1/16
	5		CL	SAA		4-6	D	3/4 1/6	0.0
	10				Lab 09:20	9-11	D	4 7/16 1/4	10.0
			SM	SAND, sm. silt, fine-grained grey/red no odor					
	15		CL	CLAY, silty, moist 14-14.5'		14-16	D	3 4/8 9	10.0
			SM	SAND, md-coarse, tr-sm gravel tan, moist no odor					
	20		GM-SW	SAA wet @ 21' more gravel	Lab 09:30	19-21	D	3 5/8 8	10.0
	25		CL	CLAY, silty, grey, v. moist			D	3 6/16 14	0.2
	30								

sl - slight
 tr - trace
 sm - some
 & - and
 @ - at
 w - with

v - very
 lt - light
 dk - dark
 bf - buff
 brn - brown
 blk - black

f - fine
 m - medium
 c - coarse
 BH - Bore Hole
 SAA - Same As Above

SAMPLE TYPE

D - DRIVE C Core recovery
 C - CORE
 G - GRAB Core lost

Water level drilled

GEOLOGIC BORING LOG

BORING NO. S8-02 CONTRACTOR: CCI DATE SPUD: 7/8/97 09:50
 CLIENT: AFCEE RIG TYPE: CME DATE CMPL: 7/8/97
 JOB NO.: 726876.24120 DRLG METHOD: HSA ELEVATION: —
 LOCATION: Gunter Annex ST-01 BORING DIA.: 4.5" TEMP.: 85-90°F
 GEOLOGIST: J. Hall DRLG FLUID: — WEATHER: p. Sunny
 COMMENTS: —

Elev. (ft.)	Depth (ft.)	Pro- file	US CS	Geologic Description	Samples		Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (open)
					No.	Depth (ft)			
	1		CL	CLAY, silty, red/brn, moist no odor		0-5			0.0
	5								
				SAA		5-7	D	¹² ₂₀ 18	0.2
			GP	SAND & GRAVEL, white/orange moist (Fill?)					
	10								
				SAA (Fill?)		10-12	D	¹⁸ ₅₀ 4	0.0
	15								
				SAA	Lab 10:05	15-17	D	⁷³ ₁	0.0
	20								
				SAA orange @ 21' wet @ 21' no odor	Lab 10:10	20-22	D	⁵⁹ ₁₀ 12	0.2
			CL	CLAY, silty, grey, wet no odor		22-24	D	¹¹ ₃ 14	0.1
	25			TD					
	30								

sl - slight
tr - trace
sm - some
& - and
@ - at
w - with

v - very
lt - light
dk - dark
bf - buff
brn - brown
blk - black

f - fine
m - medium
c - coarse
BH - Bore Hole
SAA - Same As Above

SAMPLE TYPE

D - DRIVE C Core recovery
C - CORE
G - GRAB Core lost

Water level drilled

GEOLOGIC BORING LOG

BORING NO. S803 CONTRACTOR: CCI DATE SPUD: 7/8/97 11:15
 CLIENT: AFCEE RIG TYPE: CME DATE CMPL: 7/8/97
 JOB NO.: 726876.24120 DRLG METHOD: HSA ELEVATION: —
 LOCATION: Gunter Annex ST-001 BORING DIA.: 4.5" TEMP.: 90°F
 GEOLOGIST: J. Hall DRLG FLUID: — WEATHER: p-Sunny
 COMMENTS:

Elev. (ft.)	Depth (ft.)	Pro- file	US CS	Geologic Description	Samples		Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
					No.	Depth (ft)			
	1		CL	CLAY, silty, red/brn, moist		0-5			
	5		CL	SAA, tr. gravel		5-7	D	23 34	0.0
	10		ML	SILT, tr clay, tr v.f. sand grey- red-orange, moist		10-12	D	68 14 18	2.0
	15		SP- SM	SAND, f-v.f., tr. silt, moist lt. grey	Lab 11:25	15-17	D	5667	2.0
	20		G.P	SAND & GRAVEL, white, v. moist wet @ 21, orange @ 21.5 SAA, wet, grey stain sl. odor	Lab 11:35	20-22	D	1012 13 16	4.0
	25				Lab 12:00	22-24	D	99 12 6	400
	30								

al - slight
 tr - trace
 sm - some
 & - and
 @ - at
 w - with

v - very
 lt - light
 dk - dark
 bf - buff
 brn - brown
 blk - black

f - fine
 m - medium
 c - coarse
 BH - Bore Hole
 SAA - Same As Above

SAMPLE TYPE

D - DRIVE C Core recovery
 C - CORE
 G - GRAB Core lost

Water level drilled

GEOLOGIC BORING LOG

BORING NO. SB04
 CLIENT: AFCEE
 JOB NO.: 726876.24120
 LOCATION: Gunter Annex ST-001
 GEOLOGIST: J. Hall
 COMMENTS:

CONTRACTOR: CCI
 RIG TYPE: CME
 DRLG METHOD: HSA
 BORING DIA.: 4.5"
 DRLG FLUID: —

DATE SPUD: 7/8/97
 DATE CMPL: 7/8/97
 ELEVATION: —
 TEMP.: 90°F
 WEATHER: p. Sunny

Elev. (ft.)	Depth (ft.)	Pro- file	US CS	Geologic Description	Samples		Sample Type	Penet. Res.	Remarks TIP = Bkgnd/Reading (ppm)
					No.	Depth (ft)			
	1		ML	SILT, clayey, brn., moist		0-5			
	5								
				SILT, sm. clay & f. sand, grey/red/orange, moist		5-7	D		3.0
	10								
			ML- CL	SILT & CLAY, grey/red/orange moist, sl. odor - musty/fuel	Lab 12:05	10-12	D	99 10 20	4,000
	15								
			SP	SAND, lt. grey, moist, sl. odor		15-17	D	6667	20
	20								
			GP	SAND & GRAVEL, white, v. moist, v. sl. odor, poor recovery		20-22	D	1199	2.0
				SAA, wet		22-24	D	6878	400
	25								
	30								

sl - slight
 tr - trace
 sm - some
 & - and
 @ - at
 w - with

v - very
 lt - light
 dk - dark
 bf - buff
 brn - brown
 blk - black

f - fine
 m - medium
 c - coarse
 BH - Bore Hole
 SAA - Same As Above

SAMPLE TYPE

D - DRIVE C Core recovery
 C - CORE
 G - GRAB Core lost

Water level drilled

GEOLOGIC BORING LOG

BORING NO. S805 CONTRACTOR: CCI DATE SPUD: 7/8/97 14:05
 CLIENT: AFCEE RIG TYPE: CME DATE CMPL: 7/8/97
 JOB NO.: 726876.24120 DRLG METHOD: HSA ELEVATION: —
 LOCATION: Gunter Annex ST-01 BORING DIA.: 4.5" TEMP.: 95°F
 GEOLOGIST: J. Hall DRLG FLUID: — WEATHER: p. Sunny
 COMMENTS: —

Elev. (ft.)	Depth (ft.)	Pro- file	US CS	Geologic Description	Samples		Sample Type	Penet. Res.	Remarks TTP = Bkgrnd/Reading (ppm)
					No.	Depth (ft)			
	1		CL	CLAY, silty, brn., moist		0-5			
	5								
				SAA		5-7	D	4 ₁₂ 12	0.0
			GP	SAND & GRAVEL, brn/white, moist no odor					
	10								
				SAA, red-brn		10-12	D	5 ₂₃	0.0
	15								
				SAA lt grey-white no odor	Lab 14:15	15-17	D	24 ₅₅	2.0
	20								
				SAA		20-22	D	7 ₈₈	2.0
				SAA, grey stain, stg. odor v. moist-wet	Lab 14:25	22-24	D	6 ₇ 10	4.0
	25								
	30								

sl - slight
tr - trace
sm - some
& - and
@ - at
w - with

v - very
lt - light
dk - dark
bf - buff
brn - brown
blk - black

f - fine
m - medium
c - coarse
BH - Bore Hole
SAA - Same As Above

SAMPLE TYPE

D - DRIVE C Core recovery
C - CORE
G - GRAB Core lost

Water level drilled

GEOLOGIC BORING LOG

BORING NO. S806 CONTRACTOR: CCI DATE SPUD: 7/8/97 14:45
 CLIENT: AFCEE RIG TYPE: CME DATE CMPL: 7/8/97
 JOB NO.: 726876.24120 DRLG METHOD: HSA ELEVATION: —
 LOCATION: Gunter Annex ST-01 BORING DIA.: 4.5" TEMP.: 95°F
 GEOLOGIST: J. Hall DRLG FLUID: — WEATHER: p. Sunny
 COMMENTS: —

Elev. (ft.)	Depth (ft.)	Pro- file	US CS	Geologic Description	Samples		Sample Type	Penet. Res.	Remarks TIP = Bkgnd/Reading (ppm)
					No.	Depth (ft)			
	1		CL	CLAY, silty, brn., moist		0-5			
	5								
			ML	SILT, clayey, grey/brn./red moist no odor		5-7	D	8 11 12	5.0
	10								
				SAA		10-12	D	4 7 10 12	7.0
			SM- SC	SAND, sm silt + clay, grey/red/ orange, moist					
	15								
			ML	SILT, clayey, sm. f. sand, orange	Lab	15-17	D	34 47	10.0
			SP	SAND, f.-u.f., lt grey, moist v. sl. odor	14:50				
	20								
			GP	SAND + GRAVEL, lt grey, v. moist- wet - water @ ~21.5	Lab 15:00	20-22	D	7 11 16 10	7.0
			ML- CL	SILT + CLAY, sm. v.f. sand, grey, moist-wet, no odor		22-24	D	2 3 8 11	2.0
	25								
	30								

sl - slight
tr - trace
sm - some
& - and
@ - at
w - with

v - very
lt - light
dk - dark
bf - buff
brn - brown
blk - black

f - fine
m - medium
c - coarse
BH - Bore Hole
SAA - Same As Above

SAMPLE TYPE

D - DRIVE C Core recovery
C - CORE
G - GRAB Core lost

Water level drilled

GEOLOGIC BORING LOG

BORING NO. S807
 CLIENT: AFCEE
 JOB NO.: 726876.24120
 LOCATION: Gunter Annex ST-001
 GEOLOGIST: J. Hall
 COMMENTS:

CONTRACTOR: CCI
 RIG TYPE: CME
 DRLG METHOD: HSA
 BORING DIA.: 4.5"
 DRLG FLUID: —

DATE SPUD: 7/8/97 15:30
 DATE CMPL: 7/8/97
 ELEVATION: —
 TEMP.: 95°F
 WEATHER: p. sunny

Elev. (ft.)	Depth (ft.)	Pro- file	US CS	Geologic Description	Samples		Sample Type	Penet. Res.	Remarks TIP = Bkgnd/Reading (ppm)
					No.	Depth (ft)			
	1		SM	SAND, silty, brn, moist		0-5			
	5								
			UL	SILT, clayey, orange-brn, moist no odor		5-7	D	53 ₁₈	2.0
	10			SAA					
			ML- CL	SILT, sm. f. sand & clay, red/ grey, moist, no odor	Lab 15:50	10-12	D	46 ₁₂ 18	4.0
	15								
			ML	SILT, sm clay, lt. brn, moist, no odor		15-17	D	49 ₁₂	0.0
			GP	SAND & GRAVEL, white/orange, moist no odor					
	20								
				SAA, lt. grey-white moist no odor	Lab 16:00	20-22	D	37 ₁₂	4.0
				SAA, grey & orange wet @ 22.5		22-24	D	58 ₁₁ 11	0.0
	25								
	30								

sl - slight v - very f - fine
 tr - trace lt - light m - medium
 sm - some dk - dark c - coarse
 & - and bf - buff BH - Bore Hole
 @ - at brn - brown SAA - Same As Above
 w - with blk - black

SAMPLE TYPE

D - DRIVE C - Core recovery
 C - CORE
 G - GRAB Core lost

Water level drilled

GEOLOGIC BORING LOG

BORING NO. SB08 CONTRACTOR: CCI DATE SPUD: 7/8/97 16:20
 CLIENT: AFCEE RIG TYPE: CME DATE CMPL: 7/8/97
 JOB NO.: 720870.24120 DRLG METHOD: HSA ELEVATION: —
 LOCATION: Gunter Annex ST-001 BORING DIA.: 4.5" TEMP.: ~90°F
 GEOLOGIST: J. Hall DRLG FLUID: — WEATHER: P. Sunny
 COMMENTS:

Elev. (ft.)	Depth (ft.)	Pro- file	US CS	Geologic Description	Samples		Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
					No.	Depth (ft)			
	1		ML	SILT, sm clay, brn, moist		0-5			
	5			SAA		5-7	D	45 10 14	0.0
	10		GP	SAND & GRAVEL, red/brown/orange, moist; no odor					
	15			SAA, orange		10-12	D	412 13 14	2.0
	20		GP- GC	SAND & GRAVEL, sm. clay & silt, orange-brn, moist, no odor	Lab 16:30	15-17	D	6546	3.0
	25			SAA wet @ ~21.5	Lab 16:40		D	3343	5.0
	30		CL	CLAY, silty, grey, v. moist no odor			D	3334	1.0

sl - slight v - very f - fine
 tr - trace lt - light m - medium
 sm - some dk - dark c - coarse
 & - and bf - buff BH - Bore Hole
 @ - at brn - brown SAA - Same As Above
 w - with blk - black

SAMPLE TYPE

D - DRIVE C Core recovery
 C - CORE
 G - GRAB Core lost

Water level drilled

GROUND WATER SAMPLE

Project Name Gunter Annex
Project Number 726876.24120

Sample Number GMW-1

Type of Sample: grab composite depth interval other _____

Bailer Volume (BV)
Bailer Inside Diameter (BID) _____ (in)
Bailer Length (L) _____ (ft)
(BID/24)²(L)(π)(7.48) _____ (gal/bailer)

Total Well Depth (TD) 34.6 (ft)
Static Water Level (SWL) 26.1 (ft)
Water Column (TD-SWL) 8.5 (ft)
Casing Inside Diameter (CID) 2 in (in)
Casing Volume (CV)
(CID/24)²(TD-SWL)(π)(7.48) 1.4 (gal/casing)

Bails/Casing Volume (BCV)
(CID/24)²(TD-SWL)
CV/BV or _____ (bails/casing volume)
(BID/24)²(L)

Purge Volume (PV) 4.6 (casings) Gal.
(BCV)(PV) _____ (bails)

Time	Casing/ Bail No. Gal.	Temp °C	pH	Elec Cond μS/cm	DO mg/L	Redox mV	Odor	Visual Appearance
1643	0.1	22.2	NA	32.4	6.79		None	clear
1650	1.0	21.1		32.6	6.89		"	"
1657	2.0	21.0		32.7	6.88		"	"
1705	3.0	20.9		32.7	6.89		"	"
1713	4.0	20.9		32.7	6.80			
1718	4.6	20.9		32.7	6.98	177		

Total Volume Removed (PV) 3 (casings)
(DV)(CV) 4.6 (gallons)

Weather clear, sl breeze, ~97°F, humid

Date Sampled 7/9/97
Time Sampled 1725

Name of Sampler David Teets

GROUND WATER SAMPLE

Project Name Counter Annex
Project Number 726876.24120

Sample Number GU-GMW2

Type of Sample: grab composite depth interval other _____

Bailer Volume (BV)

Bailer Inside Diameter (BID) _____ (in)

Bailer Length (L) _____ (ft)

$(BID/24)^2(L)(\pi)(7.48)$ _____ (gal/bailer)

Total Well Depth (TD) 28.2 (ft)

Static Water Level (SWL) 24.24 (ft) 24.92 - after purge

Water Column (TD-SWL) 4 (ft) .16 gal/ft

Casing Inside Diameter (CID) _____ (in)

Casing Volume (CV)

$(CID/24)^2(TD-SWL)(\pi)(7.48)$ 0.65 (gal/casing)

Bails/Casing Volume (BCV)

$(CID/24)^2(TD-SWL)$

CV/BV or _____ (bails/casing volume)

$(BID/24)^2(L)$

Purge Volume (PV)

2.0 (casings) Gal.

(BCV)(PV) _____ (bails)

µS/cm

Time	Casing/ Bail No. Gal.	Temp °C	pH	Elec Cond	D.O mg/l	Redox mv	Odor	Visual Appearance
14:00	1.2	23		45.2	5.57		sl odor	clear
	.5 gal	22.0		42.5	5.33			
14:10	1.0	21.8		42.0	5.25			
	1.5	21.8		41.6	5.17			
14:20	2.0	21.8		41.6	5.18			
7/10/97	16:10		4.40			137		

Total Volume Removed (PV) 3 + (casings)
(DV)(CV) 2.0 (gallons)

Weather overcast, ~90°F, sl breeze, sl rain

Date Sampled 7/9/97

Time Sampled 14:20

Name of Sampler David Teets

GROUND WATER SAMPLE

Project Name Gunter Annex
Project Number 726876.24120

Sample Number GMU3

Type of Sample: grab composite depth interval other _____

Bailer Volume (BV)

Bailer Inside Diameter (BID) _____ (in)
Bailer Length (L) _____ (ft)
(BID/24)²(L)(π)(7.48) _____ (gal/bailer)

Total Well Depth (TD) 29.8 (ft)
Static Water Level (SWL) 21.8 (ft)
Water Column (TD-SWL) 8.0 (ft)
Casing Inside Diameter (CID) _____ (in)
Casing Volume (CV) 1.28 (gal/casing)
(CID/24)²(TD-SWL)(π)(7.48)

Bails/Casing Volume (BCV)

(CID/24)²(TD-SWL)
CV/BV or _____ (bails/casing volume)
(BID/24)²(L)

Purge Volume (PV) 3.84 (casings) Gal.
(BCV)(PV) _____ (bails)

Time	Casing/ Bail No. gal.	Temp °C	pH	Elec Cond	Redox mV	D.O mg/L	Odor	Visual Appearance
11:10	0.5	23.6	5.63	39.0	45.0	3.76	—	Clear
11:15	1.0	23.2	5.01	35.4	79.2	3.72	—	"
11:20	2.0	23.1	4.72	35.9	104.9	3.50	—	"
11:29	3.0	23.1	4.64	35.7	109.3	3.53	—	"
11:35	4.0	23.1	4.62	35.8	111	3.52	—	"

Total Volume Removed (PV) 3+ (casings)
(DV)(CV) 4.0 (gallons)

Weather Sunny ~ 85°F

Date Sampled 7/10/97
Time Sampled 11:40

Name of Sampler John Hall

GROUND WATER SAMPLE

Project Name Center Annex
Project Number 720876-24120

Sample Number Gmw-4

Type of Sample: grab composite depth interval other _____

Bailer Volume (BV)

Bailer Inside Diameter (BID) _____ (in)
Bailer Length (L) _____ (ft)
(BID/24)²(L)(π)(7.48) _____ (gal/bailer)

Total Well Depth (TD) 29.1 (ft)
Static Water Level (SWL) 21.42 (ft)
Water Column (TD-SWL) 8.48 (ft)
Casing Inside Diameter (CID) 7 (in)
Casing Volume (CV)
(CID/24)²(TD-SWL)(π)(7.48) 1.4 (gal/casing)

Bails/Casing Volume (BCV)

(CID/24)²(TD-SWL)

CV/BV or _____ (bails/casing volume)
(BID/24)²(L)

Purge Volume (PV)

(BCV)(PV) 6.5 (casings) gal.
_____ (bails)

Time	Casing/ Bail No.	Temp °C	pH	Elec Cond	Redox mV	DO mg/L	Odor	Visual Appearance
0934	0.4	22.2	5.76	47.9	122.5	0.87	pet. odor	clear
0942	1.3	21.5	5.68	64.0	92.0	0.39	"	"
0948	2.3	21.6	5.88	99.0	72.8	0.29		
0956	3.3	21.7	5.87	109.0	75.2	0.25		
1006	4.5	21.7	5.96	115.0	66.4	0.22		
1012	5.5	21.7	6.00	117.3	62.3	0.21		
1018	6.0	21.7	6.08	119.4	39.0	0.21		
1025	6.5	21.7	6.07	120.2	37.2	0.20		

Total Volume Removed (PV) 3+ (casings)
(DV)(CV) 6.5 (gallons)

Weather clear, sl. breeze, ~90°F

Date Sampled 7/10/97
Time Sampled 10:30

Name of Sampler David Teets

GROUND WATER SAMPLE

Project Name Gunter
Project Number 726876.24120

Sample Number GMW 44

Type of Sample: grab composite depth interval other _____

Bailer Volume (BV)
Bailer Inside Diameter (BID) _____ (in)
Bailer Length (L) _____ (ft)
(BID/24)²(L)(π)(7.48) _____ (gal/bailer)

Total Well Depth (TD) 32.30 (ft)
Static Water Level (SWL) 19.80 (ft)
Water Column (TD-SWL) 12.5 (ft)
Casing Inside Diameter (CID) _____ (in)
Casing Volume (CV)
(CID/24)²(TD-SWL)(π)(7.48) 2.0 (gal/casing)

Bails/Casing Volume (BCV)
(CID/24)²(TD-SWL)
CV/BV or _____ (bails/casing volume)
(BID/24)²(L)

Purge Volume (PV) _____ (casings)
(BCV)(PV) _____ (bails)

Time	Gasing/ Bail No. gal	Temp °C	pH	Elec Cond	Redox mV	D.O. mg/L	Odor	Visual Appearance
14:35	1 gal	23.2	5.81	23.2	87.1	0.61	fuel odor	clear
14:46	2	23.0	5.85	23.0	76.5	1.13	"	"
14:50	3	23.0	5.84	22.9	72.6	1.48	"	"
15:00	4	22.8	5.83	22.8	69.5	1.63	"	"
	5	22						
15:12	6	22.7	5.81	22.8	71.7	1.75	"	"

Total Volume Removed (PV) 3+ (casings)
(DV)(CV) 6 (gallons)

Weather p.c. cloudy, ~90°F

Date Sampled 7/10/97
Time Sampled 15:20

Name of Sampler John Hall

GROUND WATER SAMPLE

Project Name Gunter
Project Number 726876.24120

Sample Number GMW-45

Type of Sample: grab composite depth interval other

Bailer Volume (BV)
Bailer Inside Diameter (BID) _____ (in)
Bailer Length (L) _____ (ft)
(BID/24)²(L)(π)(7.48) _____ (gal/bailer)

Total Well Depth (TD) 35.0 (ft)
Static Water Level (SWL) 25.57 (ft)
Water Column (TD-SWL) 9.43 (ft)
Casing Inside Diameter (CID) 2.0 (in)
Casing Volume (CV)
(CID/24)²(TD-SWL)(π)(7.48) 1.5 (gal/casing)

Bails/Casing Volume (BCV)
(CID/24)²(TD-SWL)
CV/BV or _____ (bails/casing volume)
(BID/24)²(L)

Purge Volume (PV) _____ (casings)
(BCV)(PV) _____ (bails)

Time	Casing/ Bail No. gal.	Temp °C	pH	Elec Cond	DO mg/L	Redox mv	Odor	Visual Appearance
1520	0.1	22.9		41.6 μ S/cm	7.13		None	Clear
1528	1.0 gal	21.0		40.1	7.10	47.38		
1535	2.0	20.8		39.3	7.51			
1542	3.0	20.9		39.3	7.47			
1550	4.0	20.9		39.7	7.52			
1655	4.5	20.9		39.8	7.52			
2/10 15:50			4.69			116		

Total Volume Removed (PV) ~3 (casings)
(DV)(CV) 4.5 (gallons)

water level 25.58/ft
after purge

Weather clear ~95°F, sl breeze

Date Sampled 7/9/97
Time Sampled 1615

Name of Sampler David Teets

APPENDIX C
THIESSEN POLYGON METHOD CALCULATIONS

THEISSEN POLYGON METHOD ANALYSIS FOR TOTAL BENZENE
GUNTER ANNEX, SITE ST-001

Polygon Element	Soil Boring	Soil Concentration Depth 1 (mg/kg)	Soil Concentration Depth 2 (mg/kg)	Soil Concentration Depth 3 (mg/kg)	Mean Soil Concentration $C_{avg, i}$ (mg/kg)	Element Area A_i (ft ²)	$A_i \times C_{avg, i}$ (ft ² - mg/kg)	Area Weighted Average Concentration (mg/kg)
I	SB01	0.0005	0.0005	NA	0.0005	2910	1.455	
II	SB02	0.0005	0.0005	NA	0.0005	2000	1	
III	SB03	0.0005	0.0005	0.25	0.0837	2370	198	
IV	SB04	0.0030	NA	NA	0.0030	1390	4.17	
V	SB05	0.0005	1.0000	NA	0.5003	2240	1120.56	
VI	SB06	0.0010	0.0005	NA	0.0008	4010	3.0075	
VII	SB07	0.0005	0.0005	NA	0.0005	4830	2.415	
VIII	SB08	0.0010	0.0005	NA	0.0008	3160	2.37	
					TOTAL	22900	1300	0.06

Note:

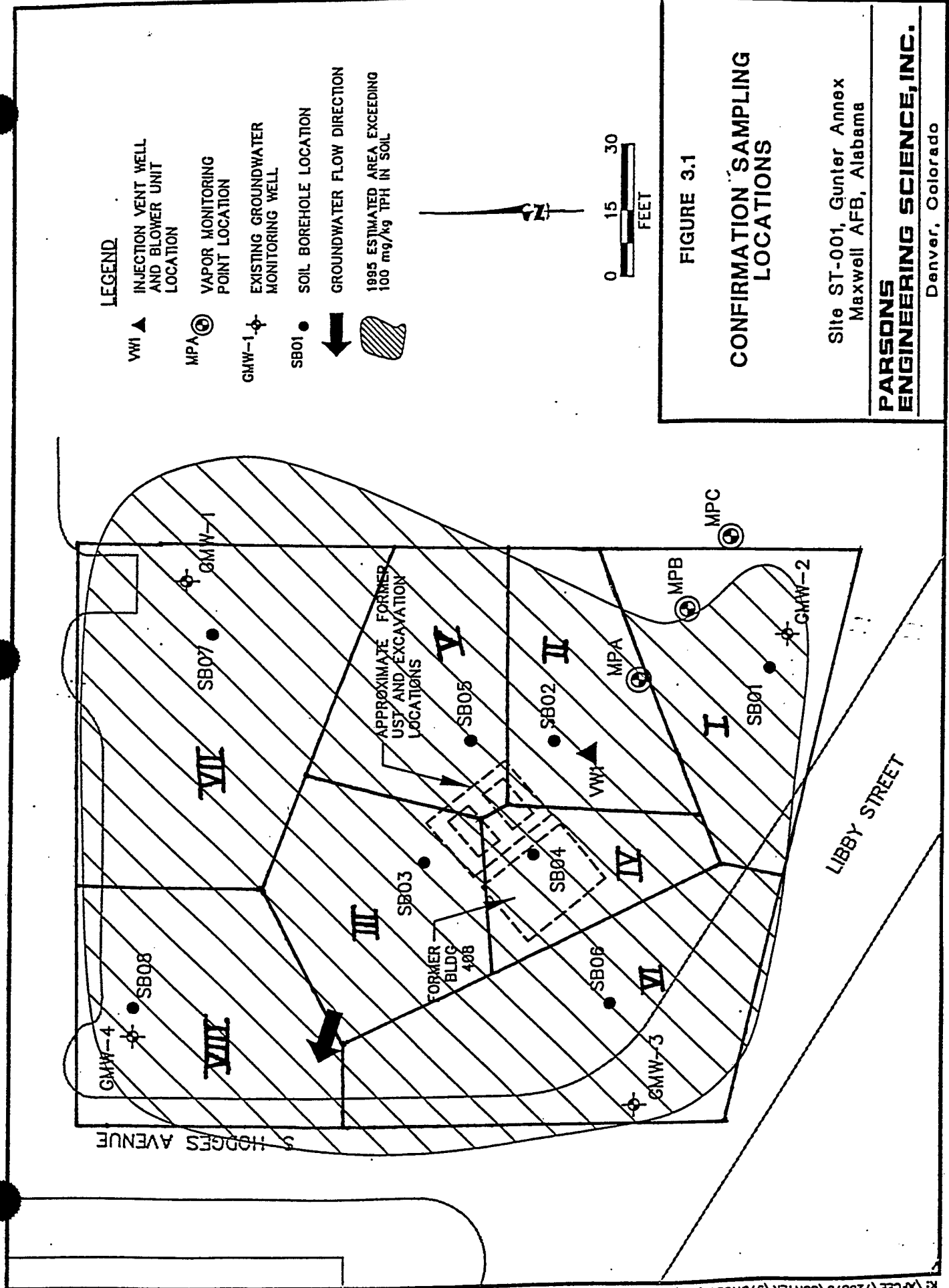
A value equal to 1/2 the method detection limit substituted for non-detected values.

**THEISSEN POLYGON METHOD ANALYSIS FOR TOTAL XYLENES
GUNTER ANNEX, SITE ST-001**

Polygon Element	Soil Boring	Soil Concentration Depth 1 (mg/kg)	Soil Concentration Depth 2 (mg/kg)	Soil Concentration Depth 3 (mg/kg)	Mean Soil Concentration $C_{avg, I}$ (mg/kg)	Element Area A_i (ft ²)	$A_i \times C_{avg, I}$ (ft ² - mg/kg)	Area Weighted Average Concentration (mg/kg)
I	SB01	0.001	0.001	NA	0.001	2910	2.91	
II	SB02	0.001	0.001	NA	0.001	2000	2	
III	SB03	0.001	0.001	0.55	0.184	2370	436	
IV	SB04	0.006	NA	NA	0.006	1390	8.34	
V	SB05	0.001	28.000	NA	14.0	2240	31400	
VI	SB06	0.001	0.001	NA	0.001	4010	4.01	
VII	SB07	0.001	0.001	NA	0.001	4830	4.83	
VIII	SB08	0.001	0.0015	NA	0.001	3160	3.95	
					TOTAL	22900	31900	1.39

Note:

A value equal to 1/2 the method detection limit substituted for non-detect values.



APPENDIX D
ADEM REPORTING FORMS

GROUNDWATER MONITORING REPORT

SUBMITTAL DATE:

___/___/___

FACILITY NAME: Maxwell AFB, Gunter Annex, Building 408
FACILITY ADDRESS: Maxwell AFB, Gunter Annex, Cong W.L. Dickinson Drive
Montgomery, Alabama 36115

FACILITY I.D. NO.: 15048-101-014625

UST OR AST INCIDENT NO.: _____

BRIEFLY ANSWER THE FOLLOWING QUESTIONS REGARDING THIS SITE:

Number of monitoring wells at the site?	7
Number of monitoring wells containing Free Product?	0
Dissolved constituents above CALs?	Yes, below ACAL's
Dissolved constituents below CALs?	
Are free product recovery activities currently in progress?	No
If yes, what date did recovery activities commence?	

Are free product recovery reports being submitted to the UST Corrective Action Unit? YES ___ NO X
If yes, please indicate the submittal date of the most recent recovery report. _____
If no, please indicate reason (i.e. recently discovered or observed) and complete the following information: _____

Monitoring wells containing free product: Identify and indicate product thickness
(ex. MW-2 / 4.0 inches) for this event:

None / _____ / _____ / _____ / _____ / _____
_____ / _____ / _____ / _____ / _____ / _____

Are assessment activities currently being conducted on the site? If yes, indicate status of assessment activities. No

Is the site currently in remediation (approved CAP)? If yes, indicate status of remediation activities (ex. received approval to implement CAP, evaluating effectiveness of remediation system):

Soil remediation (bioventing) September 12, 1995 - present

See confirmation sampling and analysis report for Site ST-001, Former Building 408, Gunter Annex, Maxwell AFB, AL

Miscellaneous information not directly requested:

SUBMIT THIS FORM WITH THE FOLLOWING ATTACHMENTS:

- Scaled site map identifying: all monitoring wells, groundwater elevations, groundwater elevation contours, and primary groundwater flow direction
- Scaled site map identifying: all monitoring wells, free product thickness, and total dissolved BTEX for each monitoring well
- Scaled site map identifying: all monitoring wells, Benzene levels, MTBE levels (if applicable for each monitoring well), or other appropriate constituents detected at this site
- Table containing: historical groundwater elevations for each of the monitoring wells.
- Table containing: historical free product thickness, Benzene levels, MTBE levels (if applicable), Ethylbenzene, Toluene, Xylenes, total BTEX levels and other appropriate constituents detected at this site for each of the monitoring wells
- Copies of lab analysis sheets for this sampling event for each of the monitoring wells
- Copies of chain of custody documentation for this sampling event
- Brief narrative description of procedures utilized to obtain groundwater sampling data

Signature of Preparer of this Report:

Type or print Name:

John Hall

Company Name:

Parsons Engineering Science, Inc.

Company Address:

1700 Broadway, Suite 900, Denver, CO 80290

ADEM GROUNDWATER BRANCH
UST SITE CLASSIFICATION SYSTEM

CHECKLIST

Please read all of the following statements and mark either yes or no if the statement applies to your site. If you have conducted a Preliminary or Secondary Investigation, all questions should be answered. Closure site assessment reports may not provide you with all the necessary information, but answer the statements with the knowledge obtained during the closure site assessment.

SITE NAME: Maxwell Air Force Base, Gunter Annex, Bldg. 408
 SITE ADDRESS: Maxwell AFB, Gunter Annex, Cong.W.L. Dickinson Dr.
Montgomery, Alabama 36115
 FACILITY I.D. NO.: 15048-010-014625
 UST INCIDENT NO.: _____
 OWNER NAME: U.S. Air Force Maxwell AFB, Gunter Annex
 OWNER ADDRESS: Cong. W.L. Dickinson Drive, Montgomery, AL 36115
 NAME & ADDRESS OF PERSON
 COMPLETING THIS FORM: John Hall
Parsons Engineering Science, Inc.
1700 Broadway, Suite 900, Denver, CO 80290

CLASSIFICATION	DESCRIPTION	YES	NO
CLASS A	IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR		
A.1	Vapor concentrations at or approaching explosive levels that could cause health effects, are present in a residence or building.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
A.2	Vapor concentrations at or approaching explosive levels are present in subsurface utility system(s), but no buildings or residences are impacted.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CLASS B	IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR		
B.1	An active public water supply well, public water supply line, or public surface water intake is impacted or immediately threatened.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B.2	An active domestic water supply well, domestic water supply line or domestic surface water intake is impacted or immediately threatened.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B.3	The release is located within a designated Wellhead Protection Area I.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CLASS C	IMMEDIATE THREAT TO HUMAN HEALTH, HUMAN SAFETY OR SENSITIVE ENVIRONMENTAL RECEPTOR		
C.1	Ambient vapor/particulate concentrations exceed concentrations of concern from an acute exposure, or safety viewpoint.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C.2	Free product is present on the groundwater, at ground surface, on surface water bodies, in utilities other than water supply lines, or in surface water runoff.	<input type="checkbox"/>	<input checked="" type="checkbox"/>

CLASSIFICATION	DESCRIPTION	YES	NO
CLASS D	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
D.1	There is a potential for explosive levels, or concentrations of vapors that could cause acute effects, to accumulate in a residence or other building.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
D.2	A non-potable water supply well is impacted or immediately threatened.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
D.3	Shallow contaminated surface soils are open to public access, and dwellings, parks, playgrounds, day care centers, schools or similar use facilities are within 500 feet of those soils.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CLASS E	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
E.1	A sensitive habitat or sensitive resources (sport fish, economically important species, threatened and endangered species, etc.) are impacted and affected.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CLASS F	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
F.1	Groundwater is impacted and a public well is located within 1 mile of the site.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
F.2	Groundwater is impacted and a domestic well is located within 1,000 feet of the site.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
F.3	Contaminated soils and/or groundwater are located within designated Wellhead Protection Areas (Areas II or III).	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CLASS G	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
G.1	Contaminated soils and/or groundwater are located within areas vulnerable to contamination from surface sources.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CLASS H	SHORT TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
H.1	Impacted surface water, stormwater or groundwater discharges within 500 feet of a surface water body used for human drinking water, whole body water-contact sports, or habitat to a protected or listed endangered plant and animal species.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CLASS I	LONG TERM THREAT TO HUMAN HEALTH, SAFETY, OR SENSITIVE ENVIRONMENTAL RECEPTORS		
I.1.	Site has contaminated soils and/or groundwater but does not meet any of the above mentioned criteria.	<input checked="" type="checkbox"/>	<input type="checkbox"/>

ADDITIONAL COMMENTS:

Complete the classification evaluation questions listed above. Upon completion, determine the highest rank of the site (A.1 is the highest rank) based on the statements answered with a yes.

Enter the determined classification ranking	I.1
---	-----

ADEM GROUNDWATER BRANCH
SITE CLASSIFICATION CHECKLIST
(5/8/95)

APPENDIX E
LABORATORY ANALYTICAL RESULTS

ITS Intertek Testing Services Environmental Laboratories

DATE RECEIVED: 10-JUL-1997

REPORT NUMBER: D97-8568

REPORT DATE: 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

Grand JCT, CO 81503

ATTENTION : Mr. John Hall

PROJECT : 726876.24120 Gunter Annex

CASE NARRATIVE SUMMARY

This is an ITS Level 4 data package, containing results for the analysis of volatile organics, semivolatile organics and metals by EPA methodologies.

EPA Method 8020 Volatile Aromatics Analysis

Sample Dilutions

Samples D97-8568-7 and -8 were analyzed at dilutions of 1:500 and 1:5, respectively, due to high levels of non-target analytes.

Sample D97-8568-10 was analyzed at a 1:1000 dilution, respectively, due to high levels of target analytes.

Second Column Confirmations

For the analysis of sample D97-8568-10, the results for the target analytes toluene and m,p-xylene did not agree within $\pm 50\%$ between the primary and confirmation columns. Therefore, the lower result was reported, and should be considered unconfirmed.

Method 8015M Total Volatile Petroleum Hydrocarbons Analysis

Sample Dilutions

Samples D97-8568-7, -8 and -10 were analyzed at dilutions of 1:500, 1:50 and 1:1000, respectively, due to high levels of target analytes.

Method 8015M Total Extractable Petroleum Hydrocarbons Analysis

No observations were documented for the analysis of total extractable petroleum hydrocarbons.



Intertek Testing Services Environmental Laboratories

Parsons Engineering Science
page 2

Method 8310 Polynuclear Aromatic Hydrocarbons Analysis

Surrogate Recoveries

For the original analysis of sample D97-8568-13, the recovery for the surrogate p-terphenyl was outside of the QC limits of 22-167%. Therefore, the sample was re-extracted outside of holding time and reanalyzed, yielding a surrogate recovery within QC limits. The results of the original analysis were reported for this data package. The results for the reanalysis are included in the data package for confirmation.

Second Detector Confirmations

For the analysis of sample D97-8568-7, the results for the target analyte dibenzo(a,h)anthracene did not agree within $\pm 50\%$ between the UV and fluorescence detectors. Therefore, the lower result was reported, and should be considered unconfirmed.

For the analysis of sample D97-8568-10, the results for the target analytes dibenzo(a,h)anthracene and indeno(1,2,3-cd)pyrene did not agree within $\pm 50\%$ between the UV and fluorescence detectors. Therefore, the lower results were reported, and should be considered unconfirmed.


Metals Analysis

Matrix Spike Analysis

For the matrix spike/matrix spike duplicate analysis of sample D97-8568-1, the recoveries for the spiking compound lead were outside of the QC limits of 75-125%, because the concentration of this analyte in the unspiked sample was greater than four times the spiking level of 2.00 mg/Kg. Since the laboratory control spike analysis was within QC limits, the results were accepted.

No further observations were documented during the sample analysis for this project.

If there are any questions, feel free to contact Ms. Janice McKittrick, at (972) 238-5591.



Alan Humason
Data Review Group Leader

Report to:
 Company: Parsons ES
 Address: 257A 28 Rd
Grand Junction, CO 81503
 Contact: John Hall
 Phone: (970) 244-8829
 Fax: _____

Invoice to
 Company: Parsons ES
 Address: 1700 Broadway #900
Denver CO 80290
 Contact: John Ratz
 Phone: (303) 831-8100
 PO/ISO #: 726876.24120

Alternates: John Ratz

Sampler's Name
John F. Hall

Sampler's Signature


Project Name		No./Type of Containers	
Proj. No.	Identifying Marks of Sample(s)	VOA	P/O
726876.24120	Gunter Annex, Bioventing Option 2		
Matrix	Date	Time	
S	7/6/97	0920	X
S	7/6/97	0930	X
S	7/6/97	1005	X
S	7/6/97	1010	X
S	7/6/97	1125	X
S	7/6/97	1135	X
S	7/6/97	1200	X
S	7/6/97	1205	X
S	7/6/97	1415	X
S	7/6/97	1425	X

Turn around time ☒ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS

Relinquished by: (Signature) John F. Hall **Date:** 7/6/97 **Time:** 10:00

Relinquished by: (Signature) John Ratz **Date:** 7/6/97 **Time:** 10:12

Relinquished by: (Signature) _____ **Date:** _____ **Time:** _____

Remarks

Client's delivery of samples constitutes acceptance of Inchcape/ITS-Dallas terms and conditions contained in the Price Schedule.

SL - Sludge **O - Oil** **C - Charcoal tube** **P/O - Plastic or other**

Inchcape cannot accept verbal changes. Please Fax written changes to 972-238-5592

OFFICE USE ONLY

COOLER RECEIPT FORM

Date Received: 7-10-97

Project: 726876.24120

Date Logged-in: _____

Received by: For Sonney

No. of coolers received: 1

Cooler Numbers: _____

1	Shipping slip. If yes, carrier and bill number: <u>9725655461</u>	<input checked="" type="radio"/> Yes	No
2	Custody seals on cooler. If yes, how many and where: <u>1-front 1-back</u>	<input checked="" type="radio"/> Yes	No
3	Custody seals intact.	<input checked="" type="radio"/> Yes	No
4	Chain of Custody in plastic.	<input checked="" type="radio"/> Yes	No
5	Chain of Custody filled out properly.	<input checked="" type="radio"/> Yes	No
6	Client signed Chain of Custody.	<input checked="" type="radio"/> Yes	No
7	Samples shipped on ice. If no, temperature of cooler: _____	<input checked="" type="radio"/> Yes	No
8	All bottles sealed.	Yes	<input checked="" type="radio"/> No
9	All bottles received intact.	<input checked="" type="radio"/> Yes	No
10	Labels in good condition and complete.	<input checked="" type="radio"/> Yes	No
11	Sample labels agree with Chain of Custody.	<input checked="" type="radio"/> Yes	No
12	Correct containers used.	<input checked="" type="radio"/> Yes	No
13	Correct preservative used.	<input checked="" type="radio"/> Yes	No
14	Sufficient sample provided.	<input checked="" type="radio"/> Yes	No
15	Bubbles absent from VOA.	<input checked="" type="radio"/> Yes	No
16	Comments (use corrective action form if necessary): _____ _____ _____ _____ _____ _____		

** If client or project manager need to be notify for any reason, please use the Case Narrative/Corrective Action green form.

Intertek Testing Services



Environmental Laboratories

FedEx USA Airbill

Tracking Number 9725655461

1 From 7/19/97 Sender's FedEx Account Number 167402461
 Date (970) 244-8829
 John Hall Phone 303-831-8100
 Company ENGINEERING SCIENCE INC Dept./Floor/Suite/Room

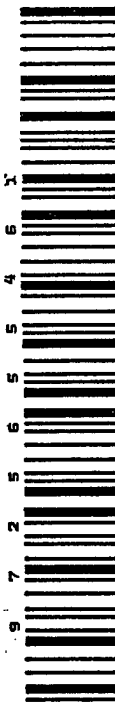
Address 1700 BROADWAY STE 900
 City DENVER State CO Zip 80202

2 Your Internal Billing Reference Information
 3 To Janine McKilrick 19721238-5591
 Recipient's Name ITS Environmental Laboratories
 Company Dept./Floor/Suite/Room

Address 1089 E. Collins Blvd. #100
 City Richardson State TX Zip 75081

For HOLD at FedEx Location check here
 1 ☐ Hold Weekday 3 ☐ Hold Saturday (Not available at all locations)
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 (Not available with FedEx First Overnight or FedEx Standard Overnight)



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 2 ☒ FedEx Priority Overnight 5 ☐ FedEx Standard Overnight 3 ☐ FedEx 2Day*
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 7 ☐ FedEx Overnight Freight 8 ☐ FedEx 2Day Light
 (For packages over 150 pounds, call for delivery schedule)
 9 ☐ NEW FedEx First Overnight
 (If you need to ship a package, please select the appropriate service from the list below)

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Special Handling
 Does this shipment contain dangerous goods? 4 Yes ☐ No ☒
 6 Dry Ice (Temperature: -70°C or below, not required)
 CA Cargo Aircraft Only
 Payment
 Bill to: ☒ Sender 2 ☐ Recipient 3 ☐ Third Party 4 ☐ Credit Card 5 ☐ Cash/Check
 (If not bill to the addressee)

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 Credit Card No. _____
 Exp. Date _____
 Total Packages 1 Total Weight 57 Total Charges \$ _____
 Release Signature _____

When the shipping value is higher than \$100 for packages, you pay an additional charge. See SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY section for further information.

Your signature authorizes Federal Express to deliver this shipment without obtaining a signature and agrees to indemnify and hold harmless Federal Express from any resulting claims.
 WCSL 0298
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 232

Intertek Testing Services NA Inc.
 1089 East Collins Boulevard Richardson, TX 75081
 Telephone (972) 238-5591 Fax (972) 238-5592



Intertek Testing Services Environmental Laboratories

ANALYTICAL REPORT

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall
PROJECT : 726876.24120 Gunter Annex

Included in this data package are the analytical results for the sample group which you have submitted to Intertek Testing Services for analysis. These results are representative of the samples as received by the laboratory.

The information contained herein has undergone extensive review and is deemed accurate and complete. Sample analysis and quality control were performed in accordance with all applicable protocols. Please refrain from reproducing this report except in its entirety.

If you have any questions regarding this report and its associated materials please call your Project Manager at (214) 238-5591.

We appreciate the opportunity to serve you and look forward to providing continued service in the future.

Martin Jeffus
General Manager



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-1
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.42 mg/Kg	< 1.42 mg/Kg	U
Acenaphthylene	1.82 mg/Kg	< 1.82 mg/Kg	U
Anthracene	0.521 mg/Kg	< 0.521 mg/Kg	U
Benzo(a)anthracene	0.0107 mg/Kg	< 0.0107 mg/Kg	U
Benzo(a)pyrene	0.0178 mg/Kg	< 0.0178 mg/Kg	U
Benzo(b)fluoranthene	0.0142 mg/Kg	< 0.0142 mg/Kg	U
Benzo(g,h,i)perylene	0.0592 mg/Kg	< 0.0592 mg/Kg	U
Benzo(k)fluoranthene	0.0130 mg/Kg	< 0.0130 mg/Kg	U
Chrysene	0.118 mg/Kg	< 0.118 mg/Kg	U
Dibenz(a,h)anthracene	0.0237 mg/Kg	< 0.0237 mg/Kg	U
Fluoranthene	0.166 mg/Kg	< 0.166 mg/Kg	U
Fluorene	0.166 mg/Kg	< 0.166 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0355 mg/Kg	< 0.0355 mg/Kg	U
Naphthalene	1.42 mg/Kg	< 1.42 mg/Kg	U



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8568-1
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.498 mg/Kg	< 0.498 mg/Kg	U
Pyrene	0.213 mg/Kg	< 0.213 mg/Kg	U
p-Terphenyl (SS)		0.237 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-1

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.063 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-1
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		RESULTS
Total Extractable Hydrocarbons	11.8	mg/Kg	7.6 mg/Kg
Triacontane (SS)			8.68 mg/Kg

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-1

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB01-10#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.18 mg/Kg	< 1.18 mg/Kg	U
Fluorobenzene (SS)		0.059 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-1
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	2 mg/Kg	16 mg/Kg	D.
Dilution Factor : 10 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 21-JUL-1997 by AH QC Batch No : AC160-16F			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-1

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	84.4 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-2

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-20#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.29 mg/Kg	< 1.29 mg/Kg	U
Acenaphthylene	1.65 mg/Kg	< 1.65 mg/Kg	U
Anthracene	0.472 mg/Kg	< 0.472 mg/Kg	U
Benzo(a)anthracene	0.0097 mg/Kg	< 0.0097 mg/Kg	U
Benzo(a)pyrene	0.0161 mg/Kg	< 0.0161 mg/Kg	U
Benzo(b)fluoranthene	0.0129 mg/Kg	< 0.0129 mg/Kg	U
Benzo(g,h,i)perylene	0.0537 mg/Kg	< 0.0537 mg/Kg	U
Benzo(k)fluoranthene	0.0118 mg/Kg	< 0.0118 mg/Kg	U
Chrysene	0.107 mg/Kg	< 0.107 mg/Kg	U
Dibenz(a,h)anthracene	0.0215 mg/Kg	< 0.0215 mg/Kg	U
Fluoranthene	0.150 mg/Kg	< 0.150 mg/Kg	U
Fluorene	0.150 mg/Kg	< 0.150 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0322 mg/Kg	< 0.0322 mg/Kg	U
Naphthalene	1.29 mg/Kg	< 1.29 mg/Kg	U



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8568-2
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.451 mg/Kg	< 0.451 mg/Kg	U
Pyrene	0.193 mg/Kg	< 0.193 mg/Kg	U
p-Terphenyl (SS)		0.244 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-2

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB01-20#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.058 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-20#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.7 mg/Kg	6.8 mg/Kg	J
Triacontane (SS)		7.26 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-2
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-20#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.07 mg/Kg	< 1.07 mg/Kg	U
Fluorobenzene (SS)		0.050 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-2

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB01-20#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

TOTAL METALS						
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG	
Lead	/1	0.4	mg/Kg	1.3	mg/Kg	D.
Dilution Factor : 2 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 21-JUL-1997 by AH QC Batch No : AC160-16F						

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-2

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB01-20#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Solids /1	0.01 %	93.2 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-3

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Acenaphthene	1.33	mg/Kg	< 1.33 mg/Kg	U
Acenaphthylene	1.70	mg/Kg	< 1.70 mg/Kg	U
Anthracene	0.486	mg/Kg	< 0.486 mg/Kg	U
Benzo(a)anthracene	0.0099	mg/Kg	< 0.0099 mg/Kg	U
Benzo(a)pyrene	0.0166	mg/Kg	< 0.0166 mg/Kg	U
Benzo(b)fluoranthene	0.0133	mg/Kg	< 0.0133 mg/Kg	U
Benzo(g,h,i)perylene	0.0553	mg/Kg	< 0.0553 mg/Kg	U
Benzo(k)fluoranthene	0.0122	mg/Kg	< 0.0122 mg/Kg	U
Chrysene	0.111	mg/Kg	< 0.111 mg/Kg	U
Dibenz(a,h)anthracene	0.0221	mg/Kg	< 0.0221 mg/Kg	U
Fluoranthene	0.155	mg/Kg	< 0.155 mg/Kg	U
Fluorene	0.155	mg/Kg	< 0.155 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0332	mg/Kg	< 0.0332 mg/Kg	U
Naphthalene	1.33	mg/Kg	< 1.33 mg/Kg	U



Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8568-3
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.464 mg/Kg	< 0.464 mg/Kg	U
Pyrene	0.199 mg/Kg	< 0.199 mg/Kg	U
p-Terphenyl (SS)		0.262 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-3

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.055 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-3
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.0 mg/Kg	7.0 mg/Kg	J
Triacotane (SS)		8.50 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-3
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.10 mg/Kg	< 1.10 mg/Kg	U
Fluorobenzene (SS)		0.053 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-3

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB02-16#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Lead /1	1.1	mg/Kg	D
Dilution Factor : 5 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 21-JUL-1997 by AH QC Batch No : AC160-16F			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-3

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB02-16#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids		/1	0.01 %	90.5 %	-
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB					
QC Batch No : 0716221607					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-4

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.28 mg/Kg	< 1.28 mg/Kg	U
Acenaphthylene	1.65 mg/Kg	< 1.65 mg/Kg	U
Anthracene	0.470 mg/Kg	< 0.470 mg/Kg	U
Benzo(a)anthracene	0.0096 mg/Kg	< 0.0096 mg/Kg	U
Benzo(a)pyrene	0.0160 mg/Kg	< 0.0160 mg/Kg	U
Benzo(b)fluoranthene	0.0128 mg/Kg	< 0.0128 mg/Kg	U
Benzo(g,h,i)perylene	0.0534 mg/Kg	< 0.0534 mg/Kg	U
Benzo(k)fluoranthene	0.0118 mg/Kg	< 0.0118 mg/Kg	U
Chrysene	0.107 mg/Kg	< 0.107 mg/Kg	U
Dibenz(a,h)anthracene	0.0214 mg/Kg	< 0.0214 mg/Kg	U
Fluoranthene	0.150 mg/Kg	< 0.150 mg/Kg	U
Fluorene	0.150 mg/Kg	< 0.150 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0320 mg/Kg	< 0.0320 mg/Kg	U
Naphthalene	1.28 mg/Kg	< 1.28 mg/Kg	U



Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8568-4
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.449 mg/Kg	< 0.449 mg/Kg	U
Pyrene	0.192 mg/Kg	< 0.192 mg/Kg	U
p-Terphenyl (SS)		0.246 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-4
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.059 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-4

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB02-21#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 15-JUL-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 17-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.7 mg/Kg	6.0 mg/Kg	J
Triacontane (SS)		7.53 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-4
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.07 mg/Kg	< 1.07 mg/Kg	U
Fluorobenzene (SS)		0.051 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED :: 10-JUL-1997

REPORT NUMBER : D97-8568-4
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	0.4 mg/Kg	2.5 mg/Kg	D.
Dilution Factor : 2 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 17-JUL-1997 by GGD QC Batch No : AC160-16F			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-4
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB02-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	93.6 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-5

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.35 mg/Kg	< 1.35 mg/Kg	U
Acenaphthylene	1.73 mg/Kg	< 1.73 mg/Kg	U
Anthracene	0.493 mg/Kg	< 0.493 mg/Kg	U
Benzo(a)anthracene	0.0101 mg/Kg	< 0.0101 mg/Kg	U
Benzo(a)pyrene	0.0168 mg/Kg	< 0.0168 mg/Kg	U
Benzo(b)fluoranthene	0.0135 mg/Kg	< 0.0135 mg/Kg	U
Benzo(g,h,i)perylene	0.0561 mg/Kg	< 0.0561 mg/Kg	U
Benzo(k)fluoranthene	0.0123 mg/Kg	< 0.0123 mg/Kg	U
Chrysene	0.112 mg/Kg	< 0.112 mg/Kg	U
Dibenz(a,h)anthracene	0.0224 mg/Kg	< 0.0224 mg/Kg	U
Fluoranthene	0.157 mg/Kg	< 0.157 mg/Kg	U
Fluorene	0.157 mg/Kg	< 0.157 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0336 mg/Kg	< 0.0336 mg/Kg	U
Naphthalene	1.35 mg/Kg	< 1.35 mg/Kg	U



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8568-5
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.471 mg/Kg	< 0.471 mg/Kg	U
Pyrene	0.202 mg/Kg	< 0.202 mg/Kg	U
p-Terphenyl (SS)		0.265 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-5

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB03-16#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : RFG

PREPARED ON : 22-JUL-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 22-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 25-072197

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.068 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-5

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.2 mg/Kg	6.1 mg/Kg	J
Triacontane (SS)		7.83 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-5
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : RFG
PREPARED ON : 22-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 22-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 26-072197

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.12 mg/Kg	< 1.12 mg/Kg	U
Fluorobenzene (SS)		0.050 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-5
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS						
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG	
Lead	/1	1.1	mg/Kg	3.7	mg/Kg	D.
Dilution Factor : 5 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 17-JUL-1997 by GGD QC Batch No : AC160-16F						

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-5

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids	/1	0.01	%	89.2	%
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-6
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.26 mg/Kg	< 1.26 mg/Kg	U
Acenaphthylene	1.62 mg/Kg	< 1.62 mg/Kg	U
Anthracene	0.464 mg/Kg	< 0.464 mg/Kg	U
Benzo(a)anthracene	0.0095 mg/Kg	< 0.0095 mg/Kg	U
Benzo(a)pyrene	0.0158 mg/Kg	< 0.0158 mg/Kg	U
Benzo(b)fluoranthene	0.0126 mg/Kg	< 0.0126 mg/Kg	U
Benzo(g,h,i)perylene	0.0527 mg/Kg	< 0.0527 mg/Kg	U
Benzo(k)fluoranthene	0.0116 mg/Kg	< 0.0116 mg/Kg	U
Chrysene	0.105 mg/Kg	< 0.105 mg/Kg	U
Dibenz(a,h)anthracene	0.0211 mg/Kg	< 0.0211 mg/Kg	U
Fluoranthene	0.148 mg/Kg	< 0.148 mg/Kg	U
Fluorene	0.148 mg/Kg	< 0.148 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0316 mg/Kg	< 0.0316 mg/Kg	U
Naphthalene	1.26 mg/Kg	< 1.26 mg/Kg	U



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8568-6
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.443 mg/Kg	< 0.443 mg/Kg	U
Pyrene	0.190 mg/Kg	< 0.190 mg/Kg	U
p-Terphenyl (SS)		0.258 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-6
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.057 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-6
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.5 mg/Kg	8.1 mg/Kg	J
Triacontane (SS)		7.79 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-6
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.05 mg/Kg	< 1.05 mg/Kg	U
Fluorobenzene (SS)		0.051 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-6
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Lead	/1	0.2	mg/Kg	1.7	mg/Kg
Dilution Factor : 1 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 17-JUL-1997 by GGD QC Batch No : AC160-16F					

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-6

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB03-21#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT		RESULTS
Total Solids	/1	0.01 %	94.9 %
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-7
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Acenaphthene	1.30	mg/Kg	< 1.30 mg/Kg	U
Acenaphthylene	1.67	mg/Kg	< 1.67 mg/Kg	U
Anthracene	0.477	mg/Kg	< 0.477 mg/Kg	U
Benzo(a)anthracene	0.0098	mg/Kg	0.0358 mg/Kg	
Benzo(a)pyrene	0.0163	mg/Kg	0.0195 mg/Kg	
Benzo(b)fluoranthene	0.0130	mg/Kg	< 0.0130 mg/Kg	U
Benzo(g,h,i)perylene	0.0542	mg/Kg	< 0.0542 mg/Kg	U
Benzo(k)fluoranthene	0.0119	mg/Kg	< 0.0119 mg/Kg	U
Chrysene	0.108	mg/Kg	< 0.108 mg/Kg	U
Dibenz(a,h)anthracene	0.0217	mg/Kg	< 0.0217 mg/Kg	U
Fluoranthene	0.152	mg/Kg	0.177 mg/Kg	
Fluorene	0.152	mg/Kg	< 0.152 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0325	mg/Kg	< 0.0325 mg/Kg	U
Naphthalene	1.30	mg/Kg	< 1.30 mg/Kg	U

Intertek Testing Services NA Inc.
1089 East Collins Boulevard Richardson, TX 75081
Telephone (972) 238-5591 Fax (972) 238-5592



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8568-7
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.456 mg/Kg	< 0.456 mg/Kg	U
Pyrene	0.195 mg/Kg	< 0.195 mg/Kg	U
p-Terphenyl (SS)		0.294 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-7
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 500
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.5 mg/Kg	< 0.5 mg/Kg	DU
Toluene	1.1 mg/Kg	< 1.1 mg/Kg	DU
Ethyl benzene	1.1 mg/Kg	< 1.1 mg/Kg	DU
m,p-Xylene	1.1 mg/Kg	< 1.1 mg/Kg	DU
o-Xylene	1.1 mg/Kg	< 1.1 mg/Kg	DU
Bromofluorobenzene (SS)		33.6 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-7
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Extractable Hydrocarbons	10.8	mg/Kg	106 mg/Kg
Triacotane (SS)			7.77 mg/Kg

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-7

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB03-23#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 500

METHOD FACTOR : 1

QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Volatile Hydrocarbons	542	mg/Kg	DJ
Fluorobenzene (SS)		19.4 mg/Kg	D

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-7
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Lead /1	2	mg/Kg	D.
Dilution Factor : 10 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 21-JUL-1997 by AH QC Batch No : AC160-16F			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-7
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB03-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids	/1	0.01	%	92.2	%
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-8

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB04-11#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 15-JUL-1997

ANALYSIS METHOD : EPA 8310 PR /1

ANALYZED BY : JXA

ANALYZED ON : 17-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.49 mg/Kg	< 1.49 mg/Kg	U
Acenaphthylene	1.91 mg/Kg	< 1.91 mg/Kg	U
Anthracene	0.545 mg/Kg	< 0.545 mg/Kg	U
Benzo(a)anthracene	0.0112 mg/Kg	< 0.0112 mg/Kg	U
Benzo(a)pyrene	0.0186 mg/Kg	< 0.0186 mg/Kg	U
Benzo(b)fluoranthene	0.0149 mg/Kg	< 0.0149 mg/Kg	U
Benzo(g,h,i)perylene	0.0620 mg/Kg	< 0.0620 mg/Kg	U
Benzo(k)fluoranthene	0.0136 mg/Kg	< 0.0136 mg/Kg	U
Chrysene	0.124 mg/Kg	< 0.124 mg/Kg	U
Dibenz(a,h)anthracene	0.0248 mg/Kg	< 0.0248 mg/Kg	U
Fluoranthene	0.173 mg/Kg	< 0.173 mg/Kg	U
Fluorene	0.173 mg/Kg	< 0.173 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0372 mg/Kg	< 0.0372 mg/Kg	U
Naphthalene	1.49 mg/Kg	< 1.49 mg/Kg	U



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8568-8
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.520 mg/Kg	< 0.520 mg/Kg	U
Pyrene	0.223 mg/Kg	< 0.223 mg/Kg	U
p-Terphenyl (SS)		0.271 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-8

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB04-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 5
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.006 mg/Kg	< 0.006 mg/Kg	DU
Toluene	0.012 mg/Kg	< 0.012 mg/Kg	DU
Ethyl benzene	0.012 mg/Kg	< 0.012 mg/Kg	DU
m,p-Xylene	0.012 mg/Kg	< 0.012 mg/Kg	DU
o-Xylene	0.012 mg/Kg	< 0.012 mg/Kg	DU
Bromofluorobenzene (SS)		0.372 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-8

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB04-11#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 15-JUL-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 17-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		RESULTS
Total Extractable Hydrocarbons	12.4	mg/Kg	10.5 mg/Kg
Triacontane (SS)			8.85 mg/Kg

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-8

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB04-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 50
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	62.0 mg/Kg	23.5 mg/Kg	DJ
Fluorobenzene (SS)		2.66 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-8
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB04-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Lead /1	2	mg/Kg	0.
Dilution Factor : 10 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 21-JUL-1997 by AH QC Batch No : AC160-16F			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-8

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB04-11#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids		/1	0.01 %	80.7 %	-
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607					

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-9

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
 ADDRESS : 257A 28 Rd.
 : Grand JCT, CO 81503
 ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
 ID MARKS : GU-SB05-16#
 : N1#(0-0')
 PROJECT : 726876.24120 Gunter Annex
 DATE SAMPLED : 8-JUL-1997
 PREPARATION METHOD : EPA 3550A
 PREPARED BY : CLT
 PREPARED ON : 15-JUL-1997
 ANALYSIS METHOD : EPA 8310 PR /1
 ANALYZED BY : JXA
 ANALYZED ON : 17-JUL-1997
 DILUTION FACTOR : 1
 METHOD FACTOR : 1
 QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Acenaphthene	1.26	mg/Kg	< 1.26 mg/Kg	U
Acenaphthylene	1.62	mg/Kg	< 1.62 mg/Kg	U
Anthracene	0.463	mg/Kg	< 0.463 mg/Kg	U
Benzo(a)anthracene	0.0095	mg/Kg	< 0.0095 mg/Kg	U
Benzo(a)pyrene	0.0158	mg/Kg	< 0.0158 mg/Kg	U
Benzo(b)fluoranthene	0.0126	mg/Kg	< 0.0126 mg/Kg	U
Benzo(g,h,i)perylene	0.0526	mg/Kg	< 0.0526 mg/Kg	U
Benzo(k)fluoranthene	0.0116	mg/Kg	< 0.0116 mg/Kg	U
Chrysene	0.105	mg/Kg	< 0.105 mg/Kg	U
Dibenz(a,h)anthracene	0.0211	mg/Kg	< 0.0211 mg/Kg	U
Fluoranthene	0.147	mg/Kg	< 0.147 mg/Kg	U
Fluorene	0.147	mg/Kg	< 0.147 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0316	mg/Kg	< 0.0316 mg/Kg	U
Naphthalene	1.26	mg/Kg	< 1.26 mg/Kg	U



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8568-9
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.442 mg/Kg	< 0.442 mg/Kg	U
Pyrene	0.189 mg/Kg	< 0.189 mg/Kg	U
p-Terphenyl (SS)		0.243 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-9

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.059 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-9

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
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ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.5 mg/Kg	7.7 mg/Kg	J
Triacontane (SS)		7.38 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-9

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB05-16#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.05 mg/Kg	< 1.05 mg/Kg	U
Fluorobenzene (SS)		0.046 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-9

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB05-16#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Lead /1	1.1 mg/Kg	3.0 mg/Kg	D.
Dilution Factor : 5 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 21-JUL-1997 by AH QC Batch No : AC160-16F			

Results are reported on Dry Weight basis when applicable.



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Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-9
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	95.0 %	-
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-10

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.39 mg/Kg	< 1.39 mg/Kg	U
Acenaphthylene	1.78 mg/Kg	< 1.78 mg/Kg	U
Anthracene	0.508 mg/Kg	< 0.508 mg/Kg	U
Benzo(a)anthracene	0.0104 mg/Kg	0.455 mg/Kg	
Benzo(a)pyrene	0.0173 mg/Kg	0.364 mg/Kg	
Benzo(b)fluoranthene	0.0139 mg/Kg	0.318 mg/Kg	
Benzo(g,h,i)perylene	0.0577 mg/Kg	0.206 mg/Kg	
Benzo(k)fluoranthene	0.0127 mg/Kg	0.141 mg/Kg	
Chrysene	0.115 mg/Kg	0.382 mg/Kg	
Dibenz(a,h)anthracene	0.0231 mg/Kg	0.0243 mg/Kg	
Fluoranthene	0.162 mg/Kg	2.09 mg/Kg	
Fluorene	0.162 mg/Kg	< 0.162 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0346 mg/Kg	0.184 mg/Kg	
Naphthalene	1.39 mg/Kg	< 1.39 mg/Kg	U

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1089 East Collins Boulevard Richardson, TX 75081
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REPORT NUMBER : D97-8568-10
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.485 mg/Kg	< 0.485 mg/Kg	U
Pyrene	0.208 mg/Kg	1.48 mg/Kg	
p-Terphenyl (SS)		0.271 mg/Kg	

Results are reported on Dry Weight basis when applicable.

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
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: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1000
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
Benzene	1	mg/Kg	1	mg/Kg	DJ
Toluene	2	mg/Kg	2	mg/Kg	DJ
Ethyl benzene	2	mg/Kg	< 2	mg/Kg	DU
m,p-Xylene	2	mg/Kg	12	mg/Kg	D
o-Xylene	2	mg/Kg	16	mg/Kg	D
Bromofluorobenzene (SS)			75	mg/Kg	D

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

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REPORT NUMBER : D97-8568-10

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB05-23#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 8020 C1 /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1000

METHOD FACTOR : 1

QC BATCH NO : 1-071797A

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Benzene	1	mg/Kg	DJ
Toluene	2	mg/Kg	DJ
Ethyl benzene	2	mg/Kg	DU
m,p-Xylene	2	mg/Kg	D
o-Xylene	2	mg/Kg	D
Bromofluorobenzene (SS)		75 mg/Kg	D

Results are reported on Dry Weight basis when applicable.

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Environmental Laboratories

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB05-23#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : RFG

PREPARED ON : 22-JUL-1997

ANALYSIS METHOD : EPA 8020 C2 /1

ANALYZED BY : MKS

ANALYZED ON : 22-JUL-1997

DILUTION FACTOR : 1000

METHOD FACTOR : 1

QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Toluene	2	mg/Kg	D
m,p-Xylene	2	mg/Kg	D
o-Xylene	2	mg/Kg	D
Bromofluorobenzene (SS)		74	D

Results are reported on Dry Weight basis when applicable.



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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB05-23#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.5 mg/Kg	292 mg/Kg	
Triacontane (SS)		8.63 mg/Kg	

Results are reported on Dry Weight basis when applicable.



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Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-10

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB05-23#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1000

METHOD FACTOR : 1

QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Volatile Hydrocarbons	1150	mg/Kg	DJ
Fluorobenzene (SS)		41 mg/Kg	D

Results are reported on Dry Weight basis when applicable.



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Environmental Laboratories

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB05-23#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Lead /1	2	mg/Kg	6 mg/Kg D
Dilution Factor : 10 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 21-JUL-1997 by AH QC Batch No : AC160-16F			

Results are reported on Dry Weight basis when applicable.



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Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

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REPORT DATE : 5-AUG-1997

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ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB05-23#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Solids /1	0.01 %	86.6 %	-
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

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Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-11

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB06-16#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 15-JUL-1997

ANALYSIS METHOD : EPA 8310 PR /1

ANALYZED BY : JXA

ANALYZED ON : 17-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Acenaphthene	1.36	mg/Kg	< 1.36 mg/Kg	U
Acenaphthylene	1.75	mg/Kg	< 1.75 mg/Kg	U
Anthracene	0.499	mg/Kg	< 0.499 mg/Kg	U
Benzo(a)anthracene	0.0102	mg/Kg	< 0.0102 mg/Kg	U
Benzo(a)pyrene	0.0170	mg/Kg	< 0.0170 mg/Kg	U
Benzo(b)fluoranthene	0.0136	mg/Kg	< 0.0136 mg/Kg	U
Benzo(g,h,i)perylene	0.0567	mg/Kg	< 0.0567 mg/Kg	U
Benzo(k)fluoranthene	0.0125	mg/Kg	< 0.0125 mg/Kg	U
Chrysene	0.113	mg/Kg	< 0.113 mg/Kg	U
Dibenz(a,h)anthracene	0.0227	mg/Kg	< 0.0227 mg/Kg	U
Fluoranthene	0.159	mg/Kg	< 0.159 mg/Kg	U
Fluorene	0.159	mg/Kg	< 0.159 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0340	mg/Kg	< 0.0340 mg/Kg	U
Naphthalene	1.36	mg/Kg	< 1.36 mg/Kg	U

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Environmental Laboratories

REPORT NUMBER : D97-8568-11
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.476 mg/Kg	< 0.476 mg/Kg	U
Pyrene	0.204 mg/Kg	< 0.204 mg/Kg	U
p-Terphenyl (SS)		0.259 mg/Kg	

Results are reported on Dry Weight basis when applicable.



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Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-11

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.001 mg/Kg	J
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.062 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB06-16#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 15-JUL-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 17-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.3 mg/Kg	8.8 mg/Kg	J
Triacantane (SS)		8.00 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

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REPORT NUMBER : D97-8568-11

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB06-16#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.13 mg/Kg	0.273 mg/Kg	J
Fluorobenzene (SS)		0.050 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-11
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS				
TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Lead	/1	1.1 mg/Kg	4.8 mg/Kg	D.
Dilution Factor : 5 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 21-JUL-1997 by AH QC Batch No : AC160-16F				

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-11

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB06-16#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	88.2 %	-
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221608			

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997.

REPORT NUMBER : D97-8568-12

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
 ADDRESS : 257A 28 Rd.
 : Grand JCT, CO 81503
 ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
 ID MARKS : GU-SB06-21#
 : N1#(0-0')
 PROJECT : 726876.24120 Gunter Annex
 DATE SAMPLED : 8-JUL-1997
 PREPARATION METHOD : EPA 3550A
 PREPARED BY : CLT
 PREPARED ON : 15-JUL-1997
 ANALYSIS METHOD : EPA 8310 PR /1
 ANALYZED BY : JXA
 ANALYZED ON : 17-JUL-1997
 DILUTION FACTOR : 1
 METHOD FACTOR : 1
 QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Acenaphthene	1.48	mg/Kg	< 1.48 mg/Kg	U
Acenaphthylene	1.90	mg/Kg	< 1.90 mg/Kg	U
Anthracene	0.543	mg/Kg	< 0.543 mg/Kg	U
Benzo(a)anthracene	0.0111	mg/Kg	< 0.0111 mg/Kg	U
Benzo(a)pyrene	0.0185	mg/Kg	< 0.0185 mg/Kg	U
Benzo(b)fluoranthene	0.0148	mg/Kg	< 0.0148 mg/Kg	U
Benzo(g,h,i)perylene	0.0617	mg/Kg	< 0.0617 mg/Kg	U
Benzo(k)fluoranthene	0.0136	mg/Kg	< 0.0136 mg/Kg	U
Chrysene	0.123	mg/Kg	< 0.123 mg/Kg	U
Dibenz(a,h)anthracene	0.0247	mg/Kg	< 0.0247 mg/Kg	U
Fluoranthene	0.173	mg/Kg	< 0.173 mg/Kg	U
Fluorene	0.173	mg/Kg	< 0.173 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0370	mg/Kg	< 0.0370 mg/Kg	U
Naphthalene	1.48	mg/Kg	< 1.48 mg/Kg	U



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8568-12
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.519 mg/Kg	< 0.519 mg/Kg	U
Pyrene	0.222 mg/Kg	< 0.222 mg/Kg	U
p-Terphenyl (SS)		0.280 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-12
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.069 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	12.3 mg/Kg	6.5 mg/Kg	J
Triacontane (SS)		8.60 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

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REPORT NUMBER : D97-8568-12

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science.
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB06-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.23 mg/Kg	< 1.23 mg/Kg	U
Fluorobenzene (SS)		0.056 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-12

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB06-21#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

TOTAL METALS						
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG	
Lead	/1	1.2	mg/Kg	6.3	mg/Kg	D.
Dilution Factor : 5 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 17-JUL-1997 by GGD QC Batch No : AC160-16F						

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-12

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB06-21#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	81.0 %	-
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221608			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-13

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.42 mg/Kg	< 1.42 mg/Kg	U
Acenaphthylene	1.82 mg/Kg	< 1.82 mg/Kg	U
Anthracene	0.519 mg/Kg	< 0.519 mg/Kg	U
Benzo(a)anthracene	0.0106 mg/Kg	< 0.0106 mg/Kg	U
Benzo(a)pyrene	0.0177 mg/Kg	< 0.0177 mg/Kg	U
Benzo(b)fluoranthene	0.0142 mg/Kg	< 0.0142 mg/Kg	U
Benzo(g,h,i)perylene	0.0590 mg/Kg	< 0.0590 mg/Kg	U
Benzo(k)fluoranthene	0.0130 mg/Kg	< 0.0130 mg/Kg	U
Chrysene	0.118 mg/Kg	< 0.118 mg/Kg	U
Dibenz(a,h)anthracene	0.0236 mg/Kg	< 0.0236 mg/Kg	U
Fluoranthene	0.165 mg/Kg	< 0.165 mg/Kg	U
Fluorene	0.165 mg/Kg	< 0.165 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0354 mg/Kg	< 0.0354 mg/Kg	U
Naphthalene	1.42 mg/Kg	< 1.42 mg/Kg	U



Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8568-13
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.495 mg/Kg	< 0.495 mg/Kg	U
Pyrene	0.212 mg/Kg	< 0.212 mg/Kg	U
p-Terphenyl (SS)		0.0434 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-13

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.063 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
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: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-11#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.8 mg/Kg	7.2 mg/Kg	J
Triacontane (SS)		7.92 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-13

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB07-11#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.18 mg/Kg	< 1.18 mg/Kg	U
Fluorobenzene (SS)		0.058 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

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SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB07-11#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

TOTAL METALS				
TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Lead	/1	2 mg/Kg	9 mg/Kg	D.
Dilution Factor : 10 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 21-JUL-1997 by AH QC Batch No : AC160-16F				

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

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REPORT NUMBER : D97-8568-13

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB07-11#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Total Solids /1		0.01 %		84.8 %	-
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221608					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-14

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science.
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.27 mg/Kg	< 1.27 mg/Kg	U
Acenaphthylene	1.63 mg/Kg	< 1.63 mg/Kg	U
Anthracene	0.467 mg/Kg	< 0.467 mg/Kg	U
Benzo(a)anthracene	0.0095 mg/Kg	< 0.0095 mg/Kg	U
Benzo(a)pyrene	0.0159 mg/Kg	< 0.0159 mg/Kg	U
Benzo(b)fluoranthene	0.0127 mg/Kg	< 0.0127 mg/Kg	U
Benzo(g,h,i)perylene	0.0530 mg/Kg	< 0.0530 mg/Kg	U
Benzo(k)fluoranthene	0.0117 mg/Kg	< 0.0117 mg/Kg	U
Chrysene	0.106 mg/Kg	< 0.106 mg/Kg	U
Dibenz(a,h)anthracene	0.0212 mg/Kg	< 0.0212 mg/Kg	U
Fluoranthene	0.148 mg/Kg	< 0.148 mg/Kg	U
Fluorene	0.148 mg/Kg	< 0.148 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0318 mg/Kg	< 0.0318 mg/Kg	U
Naphthalene	1.27 mg/Kg	< 1.27 mg/Kg	U



Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8568-14
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.445 mg/Kg	< 0.445 mg/Kg	U
Pyrene	0.191 mg/Kg	< 0.191 mg/Kg	U
p-Terphenyl (SS)		0.258 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB07-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	0.001 mg/Kg	J
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.059 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-14

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB07-21#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 15-JUL-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 17-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.6 mg/Kg	4.1 mg/Kg	J
Triacontane (SS)		7.94 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-14

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB07-21#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.06 mg/Kg	< 1.06 mg/Kg	U
Fluorobenzene (SS)		0.048 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-14

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB07-21#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Lead /1	0.4	mg/Kg	D
Dilution Factor : 2 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 21-JUL-1997 by AH QC Batch No : AC160-16F			

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-14

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB07-21#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Solids /1	0.01	%	94.3 %
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221608			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-15

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Acenaphthene	1.38	mg/Kg	< 1.38 mg/Kg	U
Acenaphthylene	1.78	mg/Kg	< 1.78 mg/Kg	U
Anthracene	0.508	mg/Kg	< 0.508 mg/Kg	U
Benzo(a)anthracene	0.0104	mg/Kg	< 0.0104 mg/Kg	U
Benzo(a)pyrene	0.0173	mg/Kg	< 0.0173 mg/Kg	U
Benzo(b)fluoranthene	0.0138	mg/Kg	< 0.0138 mg/Kg	U
Benzo(g,h,i)perylene	0.0577	mg/Kg	< 0.0577 mg/Kg	U
Benzo(k)fluoranthene	0.0127	mg/Kg	< 0.0127 mg/Kg	U
Chrysene	0.115	mg/Kg	< 0.115 mg/Kg	U
Dibenz(a,h)anthracene	0.0231	mg/Kg	< 0.0231 mg/Kg	U
Fluoranthene	0.161	mg/Kg	< 0.161 mg/Kg	U
Fluorene	0.161	mg/Kg	< 0.161 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0346	mg/Kg	< 0.0346 mg/Kg	U
Naphthalene	1.38	mg/Kg	< 1.38 mg/Kg	U



Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8568-15
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.484 mg/Kg	< 0.484 mg/Kg	U
Pyrene	0.208 mg/Kg	< 0.208 mg/Kg	U
p-Terphenyl (SS)		0.246 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-15

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.001 mg/Kg	J
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	0.001 mg/Kg	J
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.063 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-15

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB08-16#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 15-JUL-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 17-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG	
Total Extractable Hydrocarbons	11.5	mg/Kg	6.5	mg/Kg	J
Triacontane (SS)			8.42	mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-15

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-16#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.15 mg/Kg	< 1.15 mg/Kg	U
Fluorobenzene (SS)		0.053 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-15

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB08-16#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Lead /1	2	mg/Kg	D
Dilution Factor : 10 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 21-JUL-1997 by AH QC Batch No : AC160-16F			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-15

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB08-16#

: N1# (0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	86.7 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221608			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-16

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.58 mg/Kg	< 1.58 mg/Kg	U
Acenaphthylene	2.03 mg/Kg	< 2.03 mg/Kg	U
Anthracene	0.579 mg/Kg	< 0.579 mg/Kg	U
Benzo(a)anthracene	0.0118 mg/Kg	< 0.0118 mg/Kg	U
Benzo(a)pyrene	0.0197 mg/Kg	< 0.0197 mg/Kg	U
Benzo(b)fluoranthene	0.0158 mg/Kg	< 0.0158 mg/Kg	U
Benzo(g,h,i)perylene	0.0658 mg/Kg	< 0.0658 mg/Kg	U
Benzo(k)fluoranthene	0.0145 mg/Kg	< 0.0145 mg/Kg	U
Chrysene	0.132 mg/Kg	< 0.132 mg/Kg	U
Dibenz(a,h)anthracene	0.0263 mg/Kg	< 0.0263 mg/Kg	U
Fluoranthene	0.184 mg/Kg	< 0.184 mg/Kg	U
Fluorene	0.184 mg/Kg	< 0.184 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0395 mg/Kg	< 0.0395 mg/Kg	U
Naphthalene	1.58 mg/Kg	< 1.58 mg/Kg	U

ITS Intertek Testing Services
Environmental Laboratories

REPORT NUMBER : D97-8568-16
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.553 mg/Kg	< 0.553 mg/Kg	U
Pyrene	0.237 mg/Kg	< 0.237 mg/Kg	U
p-Terphenyl (SS)		0.301 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-16

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB08-21#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.003 mg/Kg	< 0.003 mg/Kg	U
Ethyl benzene	0.003 mg/Kg	< 0.003 mg/Kg	U
m,p-Xylene	0.003 mg/Kg	< 0.003 mg/Kg	U
o-Xylene	0.003 mg/Kg	< 0.003 mg/Kg	U
Bromofluorobenzene (SS)		0.071 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB08-21#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 15-JUL-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 17-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	13.2 mg/Kg	6.4 mg/Kg	J
Triacontane (SS)		9.68 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-16

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB08-21#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.32 mg/Kg	< 1.32 mg/Kg	U
Fluorobenzene (SS)		0.064 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-16

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB08-21#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

TOTAL METALS						
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG	
Lead	/1	3	mg/Kg	5	mg/Kg	D.
Dilution Factor : 10 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 21-JUL-1997 by AH QC Batch No : AC160-16F						

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-16
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB08-21#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	76.0 %	
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221608			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-17

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS

ID MARKS : FIELDQC#

: TB1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : LLB

PREPARED ON : 16-JUL-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : CNA

ANALYZED ON : 19-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 30071897AR

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	2.0 µg/L	< 2.0 µg/L	U
Toluene	2.0 µg/L	< 2.0 µg/L	U
Ethyl benzene	2.0 µg/L	< 2.0 µg/L	U
m,p-Xylene	2.0 µg/L	< 2.0 µg/L	U
o-Xylene	2.0 µg/L	< 2.0 µg/L	U
Bromofluorobenzene (SS)		55.4 µg/L	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-18

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	< 1.20 mg/Kg	U
Acenaphthylene	1.54 mg/Kg	< 1.54 mg/Kg	U
Anthracene	0.440 mg/Kg	< 0.440 mg/Kg	U
Benzo(a)anthracene	0.0090 mg/Kg	< 0.0090 mg/Kg	U
Benzo(a)pyrene	0.0150 mg/Kg	< 0.0150 mg/Kg	U
Benzo(b)fluoranthene	0.0120 mg/Kg	< 0.0120 mg/Kg	U
Benzo(g,h,i)perylene	0.0500 mg/Kg	< 0.0500 mg/Kg	U
Benzo(k)fluoranthene	0.0110 mg/Kg	< 0.0110 mg/Kg	U
Chrysene	0.100 mg/Kg	< 0.100 mg/Kg	U
Dibenz(a,h)anthracene	0.0200 mg/Kg	< 0.0200 mg/Kg	U
Fluoranthene	0.140 mg/Kg	< 0.140 mg/Kg	U
Fluorene	0.140 mg/Kg	< 0.140 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	< 0.0300 mg/Kg	U
Naphthalene	1.20 mg/Kg	< 1.20 mg/Kg	U



Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8568-18
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.420 mg/Kg	< 0.420 mg/Kg	U
Pyrene	0.180 mg/Kg	< 0.180 mg/Kg	U
p-Terphenyl (SS)		0.239 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-18

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: LB1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 10-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 1-071797A

BTX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.059 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-18

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.0 mg/Kg	7.5 mg/Kg	J
Triacontane (SS)		7.57 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-18

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: LB1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 10-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.00 mg/Kg	< 1.00 mg/Kg	U
Fluorobenzene (SS)		0.046 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

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REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: LB1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 10-JUL-1997

TOTAL METALS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Lead /1	0.2	mg/Kg	< 0.2 mg/Kg	U
Dilution Factor : 1 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 21-JUL-1997 by AH QC Batch No : AC160-16F				

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-19

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	2.50 mg/Kg	
Acenaphthylene	1.54 mg/Kg	2.43 mg/Kg	
Anthracene	0.440 mg/Kg	2.36 mg/Kg	
Benzo(a)anthracene	0.0090 mg/Kg	2.91 mg/Kg	
Benzo(a)pyrene	0.0150 mg/Kg	2.78 mg/Kg	
Benzo(b)fluoranthene	0.0120 mg/Kg	2.78 mg/Kg	
Benzo(g,h,i)perylene	0.0500 mg/Kg	2.84 mg/Kg	
Benzo(k)fluoranthene	0.0110 mg/Kg	2.71 mg/Kg	
Chrysene	0.100 mg/Kg	2.76 mg/Kg	
Dibenz(a,h)anthracene	0.0200 mg/Kg	3.08 mg/Kg	
Fluoranthene	0.140 mg/Kg	2.82 mg/Kg	
Fluorene	0.140 mg/Kg	2.58 mg/Kg	
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	2.61 mg/Kg	
Naphthalene	1.20 mg/Kg	2.76 mg/Kg	



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8568-19
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.420 mg/Kg	2.49 mg/Kg	
Pyrene	0.180 mg/Kg	2.54 mg/Kg	
p-Terphenyl (SS)		0.262 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-19
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.048 mg/Kg	
Ethyl benzene	0.002 mg/Kg	0.052 mg/Kg	
Bromofluorobenzene (SS)		0.059 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-19
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.0 mg/Kg	70.1 mg/Kg	
Triacontane (SS)		7.56 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-19

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: BS1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 10-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 17-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : MKS

ANALYZED ON : 17-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.00 mg/Kg	0.504 mg/Kg	J
Fluorobenzene (SS)		0.046 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-19

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: BS1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 10-JUL-1997

TOTAL METALS					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Lead	/1	0.2	mg/Kg	1.8	mg/Kg
Dilution Factor : 1 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 17-JUL-1997 by GGD QC Batch No : AC160-16F					

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-20

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: MS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.42 mg/Kg	3.00 mg/Kg	
Acenaphthylene	1.82 mg/Kg	2.91 mg/Kg	
Anthracene	0.521 mg/Kg	2.78 mg/Kg	
Benzo(a)anthracene	0.0107 mg/Kg	3.44 mg/Kg	
Benzo(a)pyrene	0.0178 mg/Kg	3.27 mg/Kg	
Benzo(b)fluoranthene	0.0142 mg/Kg	3.27 mg/Kg	
Benzo(g,h,i)perylene	0.0592 mg/Kg	3.34 mg/Kg	
Benzo(k)fluoranthene	0.0130 mg/Kg	3.20 mg/Kg	
Chrysene	0.118 mg/Kg	3.28 mg/Kg	
Dibenz(a,h)anthracene	0.0237 mg/Kg	3.65 mg/Kg	
Fluoranthene	0.166 mg/Kg	3.32 mg/Kg	
Fluorene	0.166 mg/Kg	3.08 mg/Kg	
Indeno(1,2,3-cd)pyrene	0.0355 mg/Kg	3.07 mg/Kg	
Naphthalene	1.42 mg/Kg	3.55 mg/Kg	



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8568-20
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.498 mg/Kg	2.95 mg/Kg	
Pyrene	0.213 mg/Kg	3.00 mg/Kg	
p-Terphenyl (SS)		0.295 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-20

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: MS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.063 mg/Kg	
Ethyl benzene	0.002 mg/Kg	0.070 mg/Kg	
Bromofluorobenzene (SS)		0.068 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-20
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: MS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Extractable Hydrocarbons	11.8	mg/Kg	83.6 mg/Kg
Triacontane (SS)			9.06 mg/Kg

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-20

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: MS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.18 mg/Kg	0.672 mg/Kg	J
Fluorobenzene (SS)		0.057 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-20

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB01-10#

: MS1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Lead /1	2	mg/Kg	D
Dilution Factor : 10 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 17-JUL-1997 by GGD QC Batch No : AC160-16F			

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-20

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB01-10#

: MS1#(0-0')

PROJECT : 726876.24120 Gunter, Annex

DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Solids /1	0.01	%	84.4 %
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-21

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
 ADDRESS : 257A 28 Rd.
 : Grand JCT, CO 81503
 ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
 ID MARKS : GU-SB01-10#
 : SD1#(0-0')
 PROJECT : 726876.24120 Gunter Annex
 DATE SAMPLED : 8-JUL-1997
 PREPARATION METHOD : EPA 3550A
 PREPARED BY : CLT
 PREPARED ON : 15-JUL-1997
 ANALYSIS METHOD : EPA 8310 PR /1
 ANALYZED BY : JXA
 ANALYZED ON : 16-JUL-1997
 DILUTION FACTOR : 1
 METHOD FACTOR : 1
 QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.42 mg/Kg	2.99 mg/Kg	
Acenaphthylene	1.82 mg/Kg	2.95 mg/Kg	
Anthracene	0.521 mg/Kg	2.81 mg/Kg	
Benzo(a)anthracene	0.0107 mg/Kg	3.48 mg/Kg	
Benzo(a)pyrene	0.0178 mg/Kg	3.29 mg/Kg	
Benzo(b)fluoranthene	0.0142 mg/Kg	3.32 mg/Kg	
Benzo(g,h,i)perylene	0.0592 mg/Kg	3.41 mg/Kg	
Benzo(k)fluoranthene	0.0130 mg/Kg	3.26 mg/Kg	
Chrysene	0.118 mg/Kg	3.33 mg/Kg	
Dibenz(a,h)anthracene	0.0237 mg/Kg	3.71 mg/Kg	
Fluoranthene	0.166 mg/Kg	3.35 mg/Kg	
Fluorene	0.166 mg/Kg	3.10 mg/Kg	
Indeno(1,2,3-cd)pyrene	0.0355 mg/Kg	3.13 mg/Kg	
Naphthalene	1.42 mg/Kg	3.61 mg/Kg	



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8568-21
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.498 mg/Kg	2.97 mg/Kg	
Pyrene	0.213 mg/Kg	3.03 mg/Kg	
p-Terphenyl (SS)		0.301 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-21

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB01-10#

: SD1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.064 mg/Kg	
Ethyl benzene	0.002 mg/Kg	0.070 mg/Kg	
Bromofluorobenzene (SS)		0.065 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-21

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: SD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.8 mg/Kg	82.9 mg/Kg	
Triacontane (SS)		8.31 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-21

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB01-10#

: SD1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : MGK

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : MKS

ANALYZED ON : 18-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.18 mg/Kg	0.647 mg/Kg	J
Fluorobenzene (SS)		0.057 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-21

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : GU-SB01-10#
: SD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 8-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Lead /1	2	mg/Kg	8 mg/Kg D.
Dilution Factor : 10 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 17-JUL-1997 by GGD QC Batch No : AC160-16F			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-21

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO. 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB01-10#

: SD1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 8-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	84.4 %	-
Analyzed using ASTM D2216 mod. on 16-JUL-1997 by SAB QC Batch No : 0716221607			

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-22

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : CNA
ANALYZED ON : 19-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 30071897AR

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	2.0 µg/L	< 2.0 µg/L	U
Toluene	2.0 µg/L	< 2.0 µg/L	U
Ethyl benzene	2.0 µg/L	< 2.0 µg/L	U
m,p-Xylene	2.0 µg/L	< 2.0 µg/L	U
o-Xylene	2.0 µg/L	< 2.0 µg/L	U
Bromofluorobenzene (SS)		53.0 µg/L	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-23

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS

ID MARKS : LABQC#

: BS1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 10-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : CNA

PREPARED ON : 18-JUL-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : CNA

ANALYZED ON : 19-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 30071897AR

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	2.0 µg/L	51.0 µg/L	
Ethyl benzene	2.0 µg/L	53.6 µg/L	
Bromofluorobenzene (SS)		49.8 µg/L	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-24

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: LB2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 21-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : RFG
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 25-072197

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	< 0.001 mg/Kg	U
Toluene	0.002 mg/Kg	< 0.002 mg/Kg	U
Ethyl benzene	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
o-Xylene	0.002 mg/Kg	< 0.002 mg/Kg	U
Bromofluorobenzene (SS)		0.061 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-24

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: LB2#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 21-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : RFG

PREPARED ON : 21-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : MKS

ANALYZED ON : 21-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 26-072197

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.00 mg/Kg	< 1.00 mg/Kg	U
Fluorobenzene (SS)		0.047 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-25

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 21-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : RFG
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 25-072197

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.044 mg/Kg	
Ethyl benzene	0.002 mg/Kg	0.051 mg/Kg	
Bromofluorobenzene (SS)		0.055 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-25
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 21-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : RFG
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 26-072197

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.00 mg/Kg	0.543 mg/Kg	J
Fluorobenzene (SS)		0.045 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-26

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-60A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	2.52 mg/Kg	
Acenaphthylene	1.54 mg/Kg	2.48 mg/Kg	
Anthracene	0.440 mg/Kg	2.36 mg/Kg	
Benzo(a)anthracene	0.0090 mg/Kg	2.94 mg/Kg	
Benzo(a)pyrene	0.0150 mg/Kg	2.77 mg/Kg	
Benzo(b)fluoranthene	0.0120 mg/Kg	2.82 mg/Kg	
Benzo(g,h,i)perylene	0.0500 mg/Kg	2.88 mg/Kg	
Benzo(k)fluoranthene	0.0110 mg/Kg	2.74 mg/Kg	
Chrysene	0.100 mg/Kg	2.79 mg/Kg	
Dibenz(a,h)anthracene	0.0200 mg/Kg	3.12 mg/Kg	
Fluoranthene	0.140 mg/Kg	2.84 mg/Kg	
Fluorene	0.140 mg/Kg	2.61 mg/Kg	
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	2.64 mg/Kg	
Naphthalene	1.20 mg/Kg	2.92 mg/Kg	



Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8568-26
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.420 mg/Kg	2.51 mg/Kg	
Pyrene	0.180 mg/Kg	2.57 mg/Kg	
p-Terphenyl (SS)		0.265 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-26
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 19-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : MKS
ANALYZED ON : 19-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1-071797A

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.049 mg/Kg	
Ethyl benzene	0.002 mg/Kg	0.054 mg/Kg	
Bromofluorobenzene (SS)		0.058 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-26

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 15-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 16-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-61

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.0 mg/Kg	74.2 mg/Kg	
Triacontane (SS)		7.41 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-26

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGK
PREPARED ON : 19-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : MKS
ANALYZED ON : 19-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 2-071797

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.00 mg/Kg	0.504 mg/Kg	J
Fluorobenzene (3S)		0.046 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-26

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: BD1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 22-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Lead /1	2	mg/Kg	11 mg/Kg D
Dilution Factor : 10 Prepared using EPA 3051 on 15-JUL-1997 by CEL Analyzed using EPA 7421 on 17-JUL-1997 by GGD QC Batch No : AC160-16F			

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-27

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8020 PR /1
ANALYZED BY : CNA
ANALYZED ON : 19-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 30071897AR

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	2.0 µg/L	54.9 µg/L	
Ethyl benzene	2.0 µg/L	57.3 µg/L	
Bromofluorobenzene (SS)		49.6 µg/L	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-28

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: BD2#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 22-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : RFG

PREPARED ON : 21-JUL-1997

ANALYSIS METHOD : EPA 8020 PR /1

ANALYZED BY : MKS

ANALYZED ON : 21-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 25-072197

BTEX ANALYSIS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Benzene	0.001 mg/Kg	0.047 mg/Kg	
Ethyl benzene	0.002 mg/Kg	0.054 mg/Kg	
Bromofluorobenzene (SS)		0.055 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-28

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: BD2#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 22-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : RFG

PREPARED ON : 21-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : MKS

ANALYZED ON : 21-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 26-072197

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	1.00 mg/Kg	0.586 mg/Kg	J
Fluorobenzene (SS)		0.048 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-29

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: LB#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 4-AUG-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 28-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 30-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC143-73A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	< 1.20 mg/Kg	U
Acenaphthylene	1.54 mg/Kg	< 1.54 mg/Kg	U
Anthracene	0.440 mg/Kg	< 0.440 mg/Kg	U
Benzo(a)anthracene	0.0090 mg/Kg	< 0.0090 mg/Kg	U
Benzo(a)pyrene	0.0150 mg/Kg	< 0.0150 mg/Kg	U
Benzo(b)fluoranthene	0.0120 mg/Kg	< 0.0120 mg/Kg	U
Benzo(g,h,i)perylene	0.0500 mg/Kg	< 0.0500 mg/Kg	U
Benzo(k)fluoranthene	0.0110 mg/Kg	< 0.0110 mg/Kg	U
Chrysene	0.100 mg/Kg	< 0.100 mg/Kg	U
Dibenz(a,h)anthracene	0.0200 mg/Kg	< 0.0200 mg/Kg	U
Fluoranthene	0.140 mg/Kg	< 0.140 mg/Kg	U
Fluorene	0.140 mg/Kg	< 0.140 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	< 0.0300 mg/Kg	U
Naphthalene	1.20 mg/Kg	< 1.20 mg/Kg	U



Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8568-29
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.420 mg/Kg	< 0.420 mg/Kg	U
Pyrene	0.180 mg/Kg	< 0.180 mg/Kg	U
p-Terphenyl (SS)		0.230 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-30
REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science
ADDRESS : 257A 28 Rd.
: Grand JCT, CO 81503
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: BS#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 4-AUG-1997
PREPARATION METHOD : EPA 3550A
PREPARED BY : CLT
PREPARED ON : 28-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 30-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC143-73A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	2.37 mg/Kg	
Acenaphthylene	1.54 mg/Kg	2.32 mg/Kg	
Anthracene	0.440 mg/Kg	2.34 mg/Kg	
Benzo(a)anthracene	0.0090 mg/Kg	3.03 mg/Kg	
Benzo(a)pyrene	0.0150 mg/Kg	2.69 mg/Kg	
Benzo(b)fluoranthene	0.0120 mg/Kg	2.91 mg/Kg	
Benzo(g,h,i)perylene	0.0500 mg/Kg	2.95 mg/Kg	
Benzo(k)fluoranthene	0.0110 mg/Kg	2.73 mg/Kg	
Chrysene	0.100 mg/Kg	2.88 mg/Kg	
Dibenz(a,h)anthracene	0.0200 mg/Kg	3.20 mg/Kg	
Fluoranthene	0.140 mg/Kg	2.92 mg/Kg	
Fluorene	0.140 mg/Kg	2.52 mg/Kg	
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	2.72 mg/Kg	
Naphthalene	1.20 mg/Kg	2.80 mg/Kg	



Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8568-30
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.420 mg/Kg	2.50 mg/Kg	
Pyrene	0.180 mg/Kg	2.70 mg/Kg	
p-Terphenyl (SS)		0.282 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-31

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO. 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS

ID MARKS : LABQC#

: BD#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 4-AUG-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 28-JUL-1997

ANALYSIS METHOD : EPA 8310 PR /1

ANALYZED BY : JXA

ANALYZED ON : 30-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC143-73A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	2.38 mg/Kg	
Acenaphthylene	1.54 mg/Kg	2.30 mg/Kg	
Anthracene	0.440 mg/Kg	2.33 mg/Kg	
Benzo(a)anthracene	0.0090 mg/Kg	3.04 mg/Kg	
Benzo(a)pyrene	0.0150 mg/Kg	2.72 mg/Kg	
Benzo(b)fluoranthene	0.0120 mg/Kg	2.93 mg/Kg	
Benzo(g,h,i)perylene	0.0500 mg/Kg	2.97 mg/Kg	
Benzo(k)fluoranthene	0.0110 mg/Kg	2.74 mg/Kg	
Chrysene	0.100 mg/Kg	2.89 mg/Kg	
Dibenz(a,h)anthracene	0.0200 mg/Kg	3.22 mg/Kg	
Fluoranthene	0.140 mg/Kg	2.91 mg/Kg	
Fluorene	0.140 mg/Kg	2.49 mg/Kg	
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	2.75 mg/Kg	
Naphthalene	1.20 mg/Kg	2.77 mg/Kg	



Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8568-31
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.420 mg/Kg	2.47 mg/Kg	
Pyrene	0.180 mg/Kg	2.69 mg/Kg	
p-Terphenyl (SS)		0.282 mg/Kg	

Results are reported on Dry Weight basis when applicable.

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 10-JUL-1997

REPORT NUMBER : D97-8568-32

REPORT DATE : 5-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 257A 28 Rd.

: Grand JCT, CO 81503

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Soil for IRPIMS

ID MARKS : GU-SB07-11#

: N2#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 4-AUG-1997

PREPARATION METHOD : EPA 3550A

PREPARED BY : CLT

PREPARED ON : 28-JUL-1997

ANALYSIS METHOD : EPA 8310 PR /1

ANALYZED BY : JXA

ANALYZED ON : 31-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC143-73A

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	1.20 mg/Kg	< 1.20 mg/Kg	U
Acenaphthylene	1.54 mg/Kg	< 1.54 mg/Kg	U
Anthracene	0.440 mg/Kg	< 0.440 mg/Kg	U
Benzo(a)anthracene	0.0090 mg/Kg	< 0.0090 mg/Kg	U
Benzo(a)pyrene	0.0150 mg/Kg	< 0.0150 mg/Kg	U
Benzo(b)fluoranthene	0.0120 mg/Kg	< 0.0120 mg/Kg	U
Benzo(g,h,i)perylene	0.0500 mg/Kg	< 0.0500 mg/Kg	U
Benzo(k)fluoranthene	0.0110 mg/Kg	< 0.0110 mg/Kg	U
Chrysene	0.100 mg/Kg	< 0.100 mg/Kg	U
Dibenz(a,h)anthracene	0.0200 mg/Kg	< 0.0200 mg/Kg	U
Fluoranthene	0.140 mg/Kg	< 0.140 mg/Kg	U
Fluorene	0.140 mg/Kg	< 0.140 mg/Kg	U
Indeno(1,2,3-cd)pyrene	0.0300 mg/Kg	< 0.0300 mg/Kg	U
Naphthalene	1.20 mg/Kg	< 1.20 mg/Kg	U



Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8568-32
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	0.420 mg/Kg	< 0.420 mg/Kg	U
Pyrene	0.180 mg/Kg	< 0.180 mg/Kg	U
p-Terphenyl (SS)		0.216 mg/Kg	

Results are reported on Dry Weight basis when applicable.



Intertek Testing Services Environmental Laboratories

DESCRIPTION OF REPORTING FLAGS

- U - Indicates compound was analyzed for but not detected.
- J - Indicates an estimated value. This flag is used if the compound is detected but is below the Reporting Limit.
- D - Indicates all compounds in an analysis at a secondary dilution.
- N - Indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds where the identification is based on a mass spectral library search.
- E - Indicates the compounds whose concentration exceed the limit of the instrument or the Laboratory Information Management System. The concentration will be greater than the concentration listed.
- Q - Indicates the surrogate recovery is outside the defined QC limits.
- M - Indicates the matrix has interfered with the recovery of the surrogates.
- O - Indicates the surrogate was lost because of dilution.



Intertek Testing Services Environmental Laboratories

DATE RECEIVED: 12-JUL-1997

REPORT NUMBER: D97-8703

REPORT DATE: 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science

ADDRESS : 1700 Broadway, Suite 900

Denver, CO 80290

ATTENTION : Mr. John Hall

PROJECT : 726876.24120 Gunter Annex

CASE NARRATIVE SUMMARY

This is an ITS Level 4 data package, containing results for the analysis of organic and inorganic parameters by EPA methodologies.

Sample Receipt

Sample TB04 was not received with the sample shipment. Per the client, this sample was not sent, although it is listed on the chain of custody.

EPA Method 8260 Volatile Organics Analysis

Calibrations

For the continuing calibration of instrument ITS7, the percent differences for the following compounds were outside of the QC limits of $\leq 20\%$

ITS7 7/17/97 07:23 chloromethane (39.6%)
dichlorodifluoromethane (25.6%)
bromoform (31.8%)
1,2,4-trichlorobenzene (26.4%)
hexachlorobutadiene (30.0%)
naphthalene (23.4%)
1,2,3-trichlorobenzene (468%)
2-butanone (30.0%)
4-methyl-2-pentanone (28.4%)
2-hexanone (28.4%)

ITS7 7/18/97 08:50 bromoform (39.6%)
naphthalene (268%)
1,2,3-trichlorobenzene (248%)
acetone (25.2%)
acrylonitrile (30.2%)
2-butanone (40.8%)
vinyl acetate (30.0%)

Matrix	WW - Wastewater	W - Water	S - Soil	SD - Solid	L - Liquid	A - Air Bag	C - Charcoal tube	SL - Sludge	O - Oil
Container	VOA - 40 ml vial	A/G - Amber	Or Glass	1 Liter	250 ml	Glass wide mouth	P/O - Plastic or other		

OFFICE USE ONLY

**Inchcape cannot accept verbal changes.
Please Fax written changes to
972-238-5592**

OFFICE USE ONLY

Report to:

Company: Parsons ES
 Address: 257A 28 Rd
Grand Jct, CO 81503
 Contact: John Hall
 Phone: (970) 244 8829
 Fax: _____

Invoice to

Company: Parsons ES
 Address: 1700 Broadway
Denver CO 80290
 Contact: John Ratz
 Phone: 303 8318100
 PO/SO #: 726876.24120

Sampler's Name

John Hall

Sampler's Signature

[Signature]

Proj. No. 726876.24120 Project Name Center Annex Option 2 No./Type of Containers 2

Matrix Date Time Identifying Marks of Sample(s) VOA AG 1 LI 250 ml P/O

W	7/14/97	1725	X GU-GMW 1	3	2		
W	7/14/97	1420	X GU-GMW 2	3	2		
W	7/14/97	1520	X GU-GMW-44	6	2		
W	7/14/97	1615	X GU-GMW-45	3	2		
W	7/14/97	1035	TB-02	1	2		

Lab Sample ID (Lab Use Only)

1
2
3
4
8703-6

ANALYSIS REQUESTED

VOCs
PAH 8310
Sulfide 8056
Lead 7421
TPT - 8015 M (DRO)
Methane RSKSP 175

Lab use only
Due Date:

Temp. of coolers
when received (C°):

4 2 3 4 5

Custody Seal N Y

Intact N Y

Screened
For Radioactivity ☒

* BTX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Date: Time: Remarks

7/12/97 0927

Received by: (Signature)

Date: Time: 7/14/97 13:00

Relinquished by: (Signature)

Date: Time: 7/14/97 13:00

Relinquished by: (Signature)

Date: Time: 7/14/97 13:00

Client's delivery of samples constitutes acceptance of Inchcape/TS-Dallas terms and conditions contained in the Price Schedule.

Inchcape cannot accept verbal changes.
 Please Fax written changes to
 972-238-5592

C - Charcoal tube
 P/O - Plastic or other

A - Air Bag
 250 ml - Glass wide mouth

SD - Solid
 250 ml - Glass 1 Liter

WW - Wastewater
 VOA - 40 ml vial

Matrix
 Container

OFFICE USE ONLY

COOLER RECEIPT FORM

Gunter Annex

Date Received: 7/13/97

Project: 726876-24120

Date Logged-in: 7/12/97

Received by: [Signature]

No. of coolers received: 3

Cooler Numbers: N/A

1	Shipping slip. If yes, carrier and bill number: <u>FED EX 4611683996</u>	<input checked="" type="radio"/> Yes	<input type="radio"/> No
2	Custody seals on cooler. If yes, how many and where: _____	<input checked="" type="radio"/> Yes	<input type="radio"/> No
3	Custody seals intact.	<input checked="" type="radio"/> Yes	<input type="radio"/> No
4	Chain of Custody in plastic.	<input checked="" type="radio"/> Yes	<input type="radio"/> No
5	Chain of Custody filled out properly.	<input checked="" type="radio"/> Yes	<input type="radio"/> No
6	Client signed Chain of Custody.	<input checked="" type="radio"/> Yes	<input type="radio"/> No
7	Samples shipped on ice. If no, temperature of cooler: _____	<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No JDM
8	All bottles sealed.	<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No JDM
9	All bottles received intact.	<input checked="" type="radio"/> Yes	<input type="radio"/> No
10	Labels in good condition and complete.	<input checked="" type="radio"/> Yes	<input type="radio"/> No
11	Sample labels agree with Chain of Custody.	<input checked="" type="radio"/> Yes	<input type="radio"/> No
12	Correct containers used.	<input checked="" type="radio"/> Yes	<input type="radio"/> No
13	Correct preservative used.	<input checked="" type="radio"/> Yes	<input type="radio"/> No
14	Sufficient sample provided.	<input checked="" type="radio"/> Yes	<input type="radio"/> No
15	Bubbles absent from VOA.	<input checked="" type="radio"/> Yes	<input type="radio"/> No
16	Comments (use corrective action form if necessary): _____ _____ _____ _____ _____ _____		

** If client or project manager need to be notify for any reason, please use the Case Narrative/Corrective Action green form.

SAMPLE PRESERVATION INFORMATION SHEET

Reserved By	<i>KRH</i>	JOB NUMBER
Date	<i>7-15-91</i>	
Time		Client Name <i>Parsons</i>

Sample No.	Container Type	Apparent Volume (mLs)	Initial pH* (20± 2° C)	Final pH	Preservative Added	Filtration	Comments
87103-1	AG	1L	5.5	5.5	8		NP
-2	1	1	6.0	6.0	1		1
-3	1	1	1	1	1		1
-4	1	1	5.7	5.7	1		1
-7	1	1	5.5	5.5	1		1
-8	1	1	5.6	5.6	1		1
							includes IPIL for sulfate on #s 1,2,3,4,7+8
							1AG 1L TPH (HCL) on # 1,2,3,4,7+8
							IPIL for metals on # 1,2,3,4,7+8
							APL
pH Duplicate (maximum difference = 0.2):							
Sample No. 87103-1			5.5				
pH LCS (ph = 7.0 ± 0.2):							
Number: E100			7.0				
PRESERVATION / FILTRATION KEY 1 = Pre-preserved 2 = H ₂ SO ₄ to pH<2 3 = HNO ₃ to pH<2 4 = HCl to pH<2 5 = NaOH to pH>12 6 = Na ₂ S ₂ O ₃ (0.008%) 7 = 2 mL Zn OAc/NaOH to pH>12 8 = No Preservative Required F = Chain-of-Custody indicates sample was filtered in the field L = Sample filtered (0.45 µm) in the laboratory before preservation							

* The initial pH balance is determined in accordance with EPA methods 150.1 / SW-846 9040 using a sample of aliquot which has been adjusted to $20 \pm 2^{\circ}\text{C}$

4612683996

Reflex Retrieval Copy

Sender's FedEx Account Number 1677-105

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Figure 1. Schematic diagram of the experimental setup. A laser beam is directed through a series of lenses and mirrors to illuminate a sample. The sample is mounted on a stage that can move vertically. The light reflected from the sample is collected by a lens and directed to a detector. The detector is connected to a computer, which records the data. The computer is also connected to a power supply, which provides the necessary voltage for the experiment.

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☐ Third Party
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1. *Introduction*

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FREE SERVICE

Call 800-967-8899 or visit us online at www.fishbase.org. We'll help you find the right fish for your aquarium.

FISHBASE

The world's largest online database of information about fish. It includes everything you need to know about the fish in your tank, from their care to their behavior.

THE FISHBOWL

A monthly magazine devoted to the care and keeping of tropical fish. It's the perfect resource for anyone who wants to learn more about the hobby.

FISH TALK

A weekly newsletter that provides tips and tricks for keeping your fish healthy and happy. It's free to all subscribers.

FISH CARE

A comprehensive guide to the care and keeping of tropical fish. It covers everything from water quality to feeding schedules.

FISH DISEASES

A detailed look at the most common diseases that affect tropical fish. It includes symptoms, treatments, and prevention tips.

FISH BEHAVIOR

An exploration of the fascinating world of fish behavior. It discusses how fish communicate, interact, and survive in their environments.

FISH ANATOMY

A look at the internal organs and structures of various species of fish. It's a great resource for understanding how they work.

FISH HISTORY

A journey through time, exploring the history of fishkeeping and the evolution of the hobby over the centuries.

FISH ART

A collection of beautiful illustrations of various fish species. It's a visual feast for anyone who loves the beauty of the underwater world.

FISH SCIENCE

A look at the latest scientific discoveries related to fish. It covers topics like genetics, ecology, and conservation.

FISH CULTURE

A guide to the different ways in which fish are raised and farmed. It includes information on breeding techniques and sustainable practices.

FISH TRADE

A directory of the best places to buy and sell tropical fish. It helps you find the dealers and breeders that best suit your needs.

FISH FORUM

A place where you can connect with other fishkeepers and share your experiences. It's a great way to get advice and support from the community.

FISH BOOKS

A selection of books on everything from basic fish care to advanced breeding techniques. They're available for purchase or borrowing.

FISH TOYS

A variety of fun toys and accessories for your fish. From colorful ornaments to interactive games, there's something for everyone.

FISH FEEDING

A guide to the best ways to feed your fish. It covers everything from choosing the right food to establishing a regular schedule.

FISH WATER

A detailed look at the importance of water quality in a fish tank. It explains how to test and maintain optimal conditions.

FISH PLANTS

A collection of information about the different types of artificial and live plants used in aquariums. It helps you choose the right ones for your setup.

FISH DECORATION

A look at the various ways to decorate your fish tank. It includes ideas for creating naturalistic environments and themed displays.

FISH SLEEPING

A look at the sleeping habits of different fish species. It explores how they rest and what factors influence their sleep patterns.

FISH BREEDING

A comprehensive guide to the art of breeding tropical fish. It covers everything from selecting parents to caring for the young.

FISH MIGRATION

A look at the migratory behaviors of various fish species. It discusses why they move and how it affects their lives.

FISH COMMUNICATION

A study of the different ways fish communicate with each other. It includes sounds, body language, and chemical signals.

FISH SURVIVAL

A look at the survival strategies of different fish species. It explores how they adapt to their environments and avoid predators.

FISH REPRODUCTION

A detailed look at the reproductive cycles of various fish. It covers everything from courtship rituals to egg-laying and incubation.

FISH ECOLOGY

A look at the role of fish in their ecosystems. It discusses how they interact with other organisms and contribute to the balance of the environment.

FISH PHYSIOLOGY

A study of the physiological functions of fish. It explores how their bodies work and how they adapt to different environmental conditions.

FISH GENETICS

A look at the genetic diversity of fish species. It discusses how genetics influences traits like color, shape, and behavior.

FISH EVOLUTION

A journey through the evolutionary history of fish. It explores how they have changed over millions of years and adapted to new challenges.

FISH CLASSIFICATION

A guide to the different classes and orders of fish. It helps you understand the relationships between various species and their common ancestors.

FISH IDENTIFICATION

A tool for identifying the different species of fish in your tank. It includes photos, descriptions, and key characteristics.

FISH RECORDS

A collection of records and statistics about the world of fish. It includes information on the largest, oldest, and most unusual specimens.

FISH MYTHS

A look at some of the most popular myths and legends surrounding fish. It explores their origins and whether they have any basis in reality.

FISH LEGENDS

A collection of stories and tales from different cultures about magical and mythical creatures. It includes dragons, mermaids, and more.

FISH FACTS

A compilation of interesting facts and trivia about fish. It's a fun way to learn more about these amazing animals.

FISH QUIZ

A series of quizzes and tests to challenge your knowledge of fish. It covers everything from basic facts to advanced topics.

FISH GLOSSARY

A comprehensive list of terms and definitions used in the world of fish. It's a handy reference for anyone who keeps fish.

FISH INDEX

A detailed index of all the content in this section. It makes it easy to find exactly what you're looking for.

FISH DIRECTORY

A listing of the best resources for buying and selling fish. It includes websites, phone numbers, and addresses.

FISH BIBLIOGRAPHY

A list of recommended reading material on fish. It includes books, articles, and other publications worth checking out.

FISH VIDEO

A collection of videos showing various aspects of fish life. It includes footage of fish in their natural habitats, as well as close-up shots of specific behaviors.

FISH AUDIO

A series of audio recordings featuring the sounds made by different fish species. It's a great way to hear what your fish might be saying.

FISH PHOTOGRAPHY

A guide to taking the best possible photographs of your fish. It covers everything from lighting and composition to post-processing techniques.

FISH DRAWING

A collection of drawings and sketches of various fish species. It's a great resource for artists and designers.

FISH MODELING

A look at the different ways to create realistic models of fish. It includes information on materials, tools, and techniques.

FISH PAINTING

A guide to painting lifelike depictions of fish. It covers everything from color theory to brushwork and shading.

FISH SCULPTURE

A look at the art of sculpting fish. It includes information on different styles and the skills required to create convincing pieces.

FISH CERAMICS

A collection of ceramic figurines and decorations inspired by fish. It's a unique way to bring the ocean into your home.

FISH TEXTILES

A look at fabrics and clothing items featuring fish designs. It includes t-shirts, towels, and more.

FISH JEWELRY

A series of jewelry pieces inspired by the colors and patterns of fish. It's a stylish way to show off your love for the hobby.

FISH ACCESSORIES

A wide range of other products and accessories for fish enthusiasts. From tank cleaners to fish-shaped keychains, there's something for everyone.

FISH MERCHANDISE

A collection of branded merchandise featuring fish-related logos and designs. It's a fun way to show your allegiance to the hobby.

FISH COLLECTIBLES

A look at rare and valuable collectibles related to fish. It includes coins, stamps, and other items that hold historical significance.

FISH TRAVEL

A guide to traveling around the world in search of new fish species. It includes information on destinations, permits, and logistics.

FISH ADVENTURES

A series of stories and reports from fish explorers. It describes their journeys and the incredible discoveries they've made.

FISH EXPLORATION

A look at the ongoing efforts to discover new species of fish. It highlights the importance of marine research and conservation.

FISH DISCOVERY

A collection of news stories and announcements about recent finds. It keeps you up-to-date on the latest developments in the field.

FISH NEWS

A daily update on everything happening in the world of fish. It includes local, national, and international news.

FISH EVENTS

A calendar of upcoming conferences, exhibitions, and competitions. It helps you plan ahead and participate in important events.

FISH AWARDS

A look at the various awards given to outstanding individuals in the fishkeeping community. It celebrates their achievements and contributions.

FISH HONORS

A collection of honors and titles bestowed upon notable figures. It recognizes their leadership and impact on the hobby.

FISH LEGACY

A tribute to the lasting legacies of famous fishkeepers. It explores how their work has shaped the industry and inspired others.

FISH INHERITANCE

A look at the passing down of knowledge and traditions from one generation to the next. It emphasizes the importance of mentorship and education.

FISH HERITAGE

A celebration of the rich cultural heritage associated with fish. It includes traditional recipes, customs, and beliefs.

FISH IDENTITY

A look at how fish have become symbols of identity and pride for many people. It explores the emotional connections we form with them.

FISH BELONGING

A discussion on the sense of belonging that comes from being part of a community. It highlights the support and camaraderie found among fishkeepers.

FISH CONNECTION

A look at the various ways fish connect us to nature and the world around us. It explores the therapeutic benefits of spending time with them.

FISH INSPIRATION

A source of creative inspiration drawn from the diverse forms and behaviors of fish. It encourages innovation and artistic expression.

FISH IMAGINATION

A collection of imaginative stories and scenarios involving fish. It sparks creativity and allows us to dream up new possibilities.

FISH VISION

A look at the different perspectives and visions held by various groups. It acknowledges the diversity of opinions and interests within the hobby.

FISH PERCEPTION

A discussion on how our perceptions of fish change over time. It explores the influence of science, culture, and personal experience.

FISH REALITY

A grounding look at the real-world implications of fishkeeping. It addresses practical concerns like budgeting, space requirements, and ethical considerations.

FISH IDEALISM

A look at the idealistic goals and aspirations of the hobby. It inspires us to strive for excellence and make a positive impact.

FISH UTOPIA

A vision of a perfect world where everyone enjoys the benefits of responsible fishkeeping. It serves as a reminder of the potential for harmony and joy.

FISH PARADISE

A collection of images and descriptions of idyllic scenes featuring fish. It transports us to a peaceful and beautiful underwater realm.

FISH HEAVEN

A look at the afterlife of beloved pets. It explores the spiritual beliefs and hopes of those who have lost their fish.

FISH ETERNITY

A reflection on the timeless nature of the bond between humans and fish. It suggests that their connection transcends the boundaries of time and space.

FISH IMMORTALITY

A look at the desire for immortality and how it relates to our love for fish. It discusses the ways in which we seek to preserve memories and legacy.

FISH INFINITY

A celebration of the infinite possibilities offered by the world of fish. It encourages us to embrace curiosity and explore every nook and cranny.

FISH UNIVERSE

A grand overview of the vast universe of fish and the countless wonders they hold. It leaves us in awe of the complexity and beauty of the aquatic world.

FISH COSMOS

A look at the cosmic connections between fish and the larger universe. It explores the mysteries of space and time in relation to these ancient creatures.

FISH GALAXY

A collection of images and stories that evoke a sense of wonder and discovery. It reminds us of the endless possibilities that lie ahead.

FISH NEBULA

A look at the ethereal and beautiful formations known as nebulae. It draws parallels between the celestial world and the vibrant colors of fish.

FISH STARS

A celebration of the bright stars of the fishkeeping community. It honors those who have made significant contributions and continue to inspire others.

FISH PLANETS

A look at the diverse "planets" or niches within the hobby. It acknowledges the unique interests and passions of different groups.

FISH MOONS

A collection of stories and reflections on the phases of the moon. It connects the rhythms of nature to the cycles of life in an aquarium.

FISH SUNS

A look at the power and warmth of the sun. It discusses its essential role in maintaining a healthy and thriving aquatic environment.

FISH OCEANS

A final thought on the boundless depths of the ocean and the countless secrets it still holds. It leaves us with a sense of hope and anticipation for the future.

FISH WORLD

A concluding statement on the global community of fishkeepers and the shared passion that unites them. It expresses gratitude for the joy and learning provided throughout the journey.

FISH LIFE

A final reflection on the preciousness of life and the responsibility we have to protect and cherish it. It ends with a message of love, respect, and appreciation for all living beings.

FISH LOVE

A heartfelt declaration of love for the hobby and the wonderful creatures that inhabit it. It serves as a testament to the enduring bond between humans and fish.

FISH PEACE

A wish for peace and harmony for all who share this passion. It concludes the book with a message of unity and goodwill.

FISH HAPPINESS

A final note on the pursuit of happiness and the joy found in the simple pleasures of fishkeeping. It leaves readers feeling uplifted and inspired.

FISH SUCCESS

A look at the definition of success in the context of the hobby. It emphasizes the importance of personal growth, learning, and the satisfaction derived from the process itself.

FISH PROGRESS

A reflection on the progress made throughout the book. It acknowledges the challenges overcome and the knowledge gained along the way.

FISH ACHIEVEMENT

A celebration of the accomplishments achieved by readers. It encourages them to continue their journey with confidence and enthusiasm.

FISH TRIUMPH

A final word on the triumph of the spirit and the resilience of the human mind. It inspires readers to face whatever challenges may come their way.

FISH GLORY

A look at the glory of the natural world and the marvels it contains. It reminds us of the incredible scale and complexity of the universe.

FISH HONOR

Release Signature

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1. The first part of the document is a list of names and their corresponding page numbers. The names are listed in a single column, and the page numbers are listed in a single column to the right of the names. The names are: J. A. B. C. D. E. F. G. H. I. J. K. L. M. N. O. P. Q. R. S. T. U. V. W. X. Y. Z. The page numbers are: 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819

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Rev Date 6/96
PART #147957
COFE 307

ITS Intertek Testing Services Environmental Laboratories

ANALYTICAL REPORT

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703

REPORT DATE : 14-AUG-1997

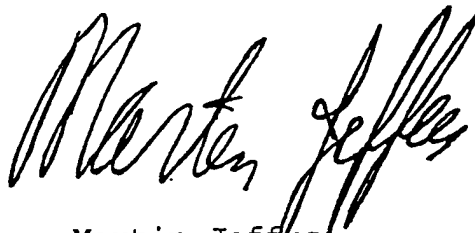
SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall
PROJECT : 726876.24120 Gunter Annex

Included in this data package are the analytical results for the sample group which you have submitted to Intertek Testing Services for analysis. These results are representative of the samples as received by the laboratory.

The information contained herein has undergone extensive review and is deemed accurate and complete. Sample analysis and quality control were performed in accordance with all applicable protocols. Please refrain from reproducing this report except in its entirety.

If you have any questions regarding this report and its associated materials please call your Project Manager at (214) 238-5591.

We appreciate the opportunity to serve you and look forward to providing continued service in the future.



Martin Jeffus
General Manager



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-1

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW1#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

Intertek Testing Services NA Inc.
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Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8703-1
ANALYSIS METHOD : EPA 8260 /1

PAGE 2

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	< 10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	< 25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	< 100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
Ethylbenzene	5.00 µg/L	< 5.00 µg/L	U
2-Hexanone	50.0 µg/L	< 50.0 µg/L	U
Bromomethane	5.00 µg/L	< 5.00 µg/L	U
Chloromethane	5.00 µg/L	< 5.00 µg/L	U
Dibromomethane	5.00 µg/L	< 5.00 µg/L	U
2-Butanone	100 µg/L	< 100 µg/L	U
Iodomethane	5.00 µg/L	< 5.00 µg/L	U

ITS Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8703-1
ANALYSIS METHOD : EPA 8260 /1

PAGE 3

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		50.1 µg/L	
Bromofluorobenzene (SS)		57.0 µg/L	
1,2-Dichloroethane-d4 (SS)		51.5 µg/L	
Dibromofluoromethane (SS)		54.5 µg/L	



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-1

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW1#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 9-JUL-1997

ANALYZED BY : MGD

ANALYZED ON : 17-JUL-1997

ANALYSIS METHOD : EPA 8260 /1

METHOD FACTOR : 1

QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

ITS Intertek Testing Services

Environmental Laboratories

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ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW1#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 9-JUL-1997

PREPARATION METHOD : EPA 3520B

PREPARED BY : TAP

PREPARED ON : 16-JUL-1997

ANALYSIS METHOD : EPA 8310 PR /1

ANALYZED BY : JXA

ANALYZED ON : 24-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Acenaphthene	18.0	µg/L	< 18.0 µg/L	U
Acenaphthylene	23.0	µg/L	< 23.0 µg/L	U
Anthracene	6.60	µg/L	< 6.60 µg/L	U
Benzo(a)anthracene	0.130	µg/L	< 0.130 µg/L	U
Benzo(a)pyrene	0.120	µg/L	< 0.120 µg/L	U
Benzo(b)fluoranthene	0.180	µg/L	< 0.180 µg/L	U
Benzo(g,h,i)perylene	0.760	µg/L	< 0.760 µg/L	U
Benzo(k)fluoranthene	0.170	µg/L	< 0.170 µg/L	U
Chrysene	1.50	µg/L	< 1.50 µg/L	U
Dibenz(a,h)anthracene	0.300	µg/L	< 0.300 µg/L	U
Fluoranthene	2.10	µg/L	< 2.10 µg/L	U
Fluorene	2.10	µg/L	< 2.10 µg/L	U
Indeno(1,2,3-cd)pyrene	0.430	µg/L	< 0.430 µg/L	U
Naphthalene	18.0	µg/L	< 18.0 µg/L	U

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Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8703-1
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	6.40 µg/L	< 6.40 µg/L	U
Pyrene	2.70 µg/L	< 2.70 µg/L	U
p-Terphenyl (SS)		8.34 µg/L	



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-1

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW1#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 9-JUL-1997

PREPARATION METHOD : EPA 3510B

PREPARED BY : KDF

PREPARED ON : 16-JUL-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 17-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 $\mu\text{g/L}$	53.0 $\mu\text{g/L}$	J
Triacontane (SS)		214 $\mu\text{g/L}$	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-1

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW1#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : LLB
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 20-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072097RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Volatile Hydrocarbons	100	µg/L	< 100 µg/L U
Fluorobenzene (SS)			48.6 µg/L



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-1

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW1#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 9-JUL-1997

TOTAL METALS				
TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Lead	/1	0.0020 mg/L	0.0017 mg/L	J
Dilution Factor : 1 Prepared using EPA 3015 on 17-JUL-1997 by CEL Analyzed using EPA 7421 on 22-JUL-1997 by GGD QC Batch No : AC160-35F				

ITS Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-1

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW1#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 9-JUL-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Sulfate /1		1.00 mg/L		0.76 mg/L	DJ
Dilution Factor : 5 Analyzed using EPA 9056 on 21-JUL-1997 by LKO QC Batch No : 32-072197I					



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8793-2
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW2#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

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Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-2
ANALYSIS METHOD : EPA 8260 /1

PAGE 2

VOLATILE ORGANICS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
2-Chloroethylvinyl ether	10.0	µg/L	<	10.0 µg/L	U
Dibromochloromethane	5.00	µg/L	<	5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0	µg/L	<	25.0 µg/L	U
1,2-Dibromoethane	5.00	µg/L	<	5.00 µg/L	U
1,2-Dichlorobenzene	5.00	µg/L	<	5.00 µg/L	U
1,3-Dichlorobenzene	5.00	µg/L	<	5.00 µg/L	U
1,4-Dichlorobenzene	5.00	µg/L	<	5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100	µg/L	<	100 µg/L	U
1,1-Dichloroethane	5.00	µg/L	<	5.00 µg/L	U
1,2-Dichloroethane	5.00	µg/L	<	5.00 µg/L	U
1,1-Dichloroethene	5.00	µg/L	<	5.00 µg/L	U
cis-1,2-Dichloroethene	5.00	µg/L	<	5.00 µg/L	U
trans-1,2-Dichloroethene	5.00	µg/L	<	5.00 µg/L	U
1,2-Dichloropropane	5.00	µg/L	<	5.00 µg/L	U
2,2-Dichloropropane	5.00	µg/L	<	5.00 µg/L	U
1,1-Dichloropropene	5.00	µg/L	<	5.00 µg/L	U
1,3-Dichloropropane	5.00	µg/L	<	5.00 µg/L	U
cis-1,3-Dichloropropene	5.00	µg/L	<	5.00 µg/L	U
trans-1,3-Dichloropropene	5.00	µg/L	<	5.00 µg/L	U
Ethylbenzene	5.00	µg/L	<	5.00 µg/L	U
2-Hexanone	50.0	µg/L	<	50.0 µg/L	U
Bromomethane	5.00	µg/L	<	5.00 µg/L	U
Chloromethane	5.00	µg/L	<	5.00 µg/L	U
Dibromomethane	5.00	µg/L	<	5.00 µg/L	U
2-Butanone	100	µg/L	<	100 µg/L	U
Iodomethane	5.00	µg/L	<	5.00 µg/L	U



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-2
ANALYSIS METHOD : EPA 8260 /1

PAGE 3

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		49.9 µg/L	
Bromofluorobenzene (SS)		59.7 µg/L	
1,2-Dichloroethane-d4 (SS)		51.0 µg/L	
Dibromofluoromethane (SS)		50.8 µg/L	

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Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-2
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW2#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

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REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW2#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : TAP
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 25-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG	
Acenaphthene	18.0 µg/L	< 18.0 µg/L	U	
Acenaphthylene	23.0 µg/L	< 23.0 µg/L	U	
Anthracene	6.60 µg/L	< 6.60 µg/L	U	
Benzo(a)anthracene	0.130 µg/L	< 0.130 µg/L	U	
Benzo(a)pyrene	0.120 µg/L	< 0.120 µg/L	U	
Benzo(b)fluoranthene	0.180 µg/L	< 0.180 µg/L	U	
Benzo(g,h,i)perylene	0.760 µg/L	< 0.760 µg/L	U	
Benzo(k)fluoranthene	0.170 µg/L	< 0.170 µg/L	U	
Chrysene	1.50 µg/L	< 1.50 µg/L	U	
Dibenz(a,h)anthracene	0.300 µg/L	< 0.300 µg/L	U	
Fluoranthene	2.10 µg/L	< 2.10 µg/L	U	
Fluorene	2.10 µg/L	< 2.10 µg/L	U	
Indeno(1,2,3-cd)pyrene	0.430 µg/L	< 0.430 µg/L	U	
Naphthalene	18.0 µg/L	< 18.0 µg/L	U	

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Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-2
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	6.40 µg/L	< 6.40 µg/L	U
Pyrene	2.70 µg/L	< 2.70 µg/L	U
p-Terphenyl (SS)		8.23 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-2
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW2#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 3510B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Total Extractable Hydrocarbons	1000	µg/L	< 1000 µg/L	U
Triacontane -(SS)			227 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-2
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW2#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : LLB
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 20-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072097RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Volatile Hydrocarbons	100	µg/L	< 100 µg/L U
Fluorobenzene (SS)			49.1 µg/L



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-2

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW2#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 9-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	0.0020 mg/L	< 0.0020 mg/L	U
Dilution Factor : 1 Prepared using EPA 3015 on 17-JUL-1997 by CEL Analyzed using EPA 7421 on 22-JUL-1997 by GGD QC Batch No : AC160-35F			



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-2

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW2#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 9-JUL-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Sulfate /1		0.20 mg/L		0.75 mg/L	
Dilution Factor : 1 Analyzed using EPA 9056 on 21-JUL-1997 by LKD QC Batch No : 32-0721971					

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Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-3

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
 ADDRESS : 1700 Broadway, Ste. 900
 : Denver, CO 80290
 ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
 ID MARKS : GU-GMW44#
 : N1#(0-0')
 PROJECT : 726876.24120 Gunter Annex
 DATE SAMPLED : 10-JUL-1997
 PREPARATION METHOD : EPA 5030
 PREPARED BY : MGD
 PREPARED ON : 17-JUL-1997
 ANALYSIS METHOD : EPA 8260 /1
 ANALYZED BY : MGD
 ANALYZED ON : 17-JUL-1997
 DILUTION FACTOR : 1
 METHOD FACTOR : 1
 QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	7.44 µg/L	
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

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REPORT NUMBER : D97-8703-3
ANALYSIS METHOD : EPA 8260 /1

PAGE 2

VOLATILE ORGANICS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
2-Chloroethylvinyl ether	10.0	µg/L	<	10.0 µg/L	U
Dibromochloromethane	5.00	µg/L	<	5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0	µg/L	<	25.0 µg/L	U
1,2-Dibromoethane	5.00	µg/L	<	5.00 µg/L	U
1,2-Dichlorobenzene	5.00	µg/L	<	5.00 µg/L	U
1,3-Dichlorobenzene	5.00	µg/L	<	5.00 µg/L	U
1,4-Dichlorobenzene	5.00	µg/L	<	5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100	µg/L	<	100 µg/L	U
1,1-Dichloroethane	5.00	µg/L	<	5.00 µg/L	U
1,2-Dichloroethane	5.00	µg/L	<	5.00 µg/L	U
1,1-Dichloroethene	5.00	µg/L	<	5.00 µg/L	U
cis-1,2-Dichloroethene	5.00	µg/L	<	5.00 µg/L	U
trans-1,2-Dichloroethene	5.00	µg/L	<	5.00 µg/L	U
1,2-Dichloropropane	5.00	µg/L	<	5.00 µg/L	U
2,2-Dichloropropane	5.00	µg/L	<	5.00 µg/L	U
1,1-Dichloropropene	5.00	µg/L	<	5.00 µg/L	U
1,3-Dichloropropane	5.00	µg/L	<	5.00 µg/L	U
cis-1,3-Dichloropropene	5.00	µg/L	<	5.00 µg/L	U
trans-1,3-Dichloropropene	5.00	µg/L	<	5.00 µg/L	U
Ethylbenzene	5.00	µg/L		251 µg/L	
2-Hexanone	50.0	µg/L	<	50.0 µg/L	U
Bromomethane	5.00	µg/L	<	5.00 µg/L	U
Chloromethane	5.00	µg/L	<	5.00 µg/L	U
Dibromomethane	5.00	µg/L	<	5.00 µg/L	U
2-Butanone	100	µg/L	<	100 µg/L	U
Iodomethane	5.00	µg/L	<	5.00 µg/L	U



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Environmental Laboratories

REPORT NUMBER : D97-8703-3
ANALYSIS METHOD : EPA 8260 /1

PAGE 3

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	68.8 µg/L	
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	120 µg/L	
1,2,4-Trimethylbenzene	5.00 µg/L	328 µg/L	
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	560 µg/L	
o-Xylene	5.00 µg/L	279 µg/L	
Toluene-d8 (SS)		48.6 µg/L	
Bromofluorobenzene (SS)		54.8 µg/L	
1,2-Dichloroethane-d4 (SS)		49.6 µg/L	
Dibromofluoromethane (SS)		51.2 µg/L	

ITS Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-3
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW44#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
Methylbutane	2.09	VOA	61 ug/L	N
Pentane	2.37	VOA	29 ug/L	N
Methylpentane	3.89	VOA	33 ug/L	N
Hexane	4.35	VOA	11 ug/L	N
Methylcyclopentane	5.25	VOA	91 ug/L	N
Methylcyclohexane	7.65	VOA	26 ug/L	N
Ethylmethylbenzene	12.48	VOA	170 ug/L	N
Ethylmethylbenzene	13.76	VOA	38 ug/L	N
Ethylmethylbenzene	13.86	VOA	54 ug/L	N
Dihydromethylindene	13.99	VOA	38 ug/L	N
Methylisopropylbenzene	14.36	VOA	51 ug/L	N
Dihydromethylindene	14.66	VOA	27 ug/L	N
Dihydromethylindene	14.84	VOA	64 ug/L	N
Naphthalene	15.52	VOA	124 ug/L	N

Intertek Testing Services Environmental Laboratories

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 : Denver, CO 80290
 ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
 ID MARKS : GU-GMW44#
 : N1#(0-0')
 PROJECT : 726876.24120 Gunter Annex
 DATE SAMPLED : 10-JUL-1997
 PREPARATION METHOD : EPA 3520B
 PREPARED BY : TAP
 PREPARED ON : 16-JUL-1997
 ANALYSIS METHOD : EPA 8310 PR /1
 ANALYZED BY : JXA
 ANALYZED ON : 25-JUL-1997
 DILUTION FACTOR : 1
 METHOD FACTOR : 1
 QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	18.0 µg/L	< 18.0 µg/L	U
Acenaphthylene	23.0 µg/L	0.0 µg/L	J
Anthracene	6.60 µg/L	< 6.60 µg/L	U
Benzo(a)anthracene	0.130 µg/L	< 0.130 µg/L	U
Benzo(a)pyrene	0.120 µg/L	< 0.120 µg/L	U
Benzo(b)fluoranthene	0.180 µg/L	< 0.180 µg/L	U
Benzo(g,h,i)perylene	0.760 µg/L	< 0.760 µg/L	U
Benzo(k)fluoranthene	0.170 µg/L	< 0.170 µg/L	U
Chrysene	1.50 µg/L	< 1.50 µg/L	U
Dibenz(a,h)anthracene	0.300 µg/L	< 0.300 µg/L	U
Fluoranthene	2.10 µg/L	< 2.10 µg/L	U
Fluorene	2.10 µg/L	< 2.10 µg/L	U
Indeno(1,2,3-cd)pyrene	0.430 µg/L	< 0.430 µg/L	U
Naphthalene	18.0 µg/L	56.2 µg/L	

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Environmental Laboratories

REPORT NUMBER : D97-8703-3
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	6.40 µg/L	< 6.40 µg/L	U
Pyrene	2.70 µg/L	< 2.70 µg/L	U
p-Terphenyl (SS)		7.63 µg/L	



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER :: D97-8703-3

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW44#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3510B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Extractable Hydrocarbons	1000	µg/L	1470 µg/L
Triacontane (SS)			233 µg/L



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-3
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW44#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 25
METHOD FACTOR : 1
QC BATCH NO : 29072197RB

TOTAL VOLATILE HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Total Volatile Hydrocarbons	2500	µg/L	4640 µg/L	D
Fluorobenzene (SS)			1120 µg/L	D

ITS Intertek Testing Services
Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-3

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW44#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 10-JUL-1997

TOTAL METALS				
TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Lead	/1	0.0020 mg/L	< 0.0020 mg/L	U
Dilution Factor : 1 Prepared using EPA 3015 on 17-JUL-1997 by CEL Analyzed using EPA 7421 on 22-JUL-1997 by GGD QC Batch No : AC160-35F				



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-3

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW44#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Sulfate /1		0.20 mg/L		0.40 mg/L	
Dilution Factor : 1 Analyzed using EPA 9056 on 21-JUL-1997 by LKD QC Batch No : 32-0721971					



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW45#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

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REPORT NUMBER : D97-8703-4
ANALYSIS METHOD : EPA 8260 /1

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VOLATILE ORGANICS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
2-Chloroethylvinyl ether	10.0	µg/L	< 10.0 µg/L	U
Dibromochloromethane	5.00	µg/L	< 5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0	µg/L	< 25.0 µg/L	U
1,2-Dibromoethane	5.00	µg/L	< 5.00 µg/L	U
1,2-Dichlorobenzene	5.00	µg/L	< 5.00 µg/L	U
1,3-Dichlorobenzene	5.00	µg/L	< 5.00 µg/L	U
1,4-Dichlorobenzene	5.00	µg/L	< 5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100	µg/L	< 100 µg/L	U
1,1-Dichloroethane	5.00	µg/L	< 5.00 µg/L	U
1,2-Dichloroethane	5.00	µg/L	< 5.00 µg/L	U
1,1-Dichloroethene	5.00	µg/L	< 5.00 µg/L	U
cis-1,2-Dichloroethene	5.00	µg/L	< 5.00 µg/L	U
trans-1,2-Dichloroethene	5.00	µg/L	< 5.00 µg/L	U
1,2-Dichloropropane	5.00	µg/L	< 5.00 µg/L	U
2,2-Dichloropropane	5.00	µg/L	< 5.00 µg/L	U
1,1-Dichloropropene	5.00	µg/L	< 5.00 µg/L	U
1,3-Dichloropropane	5.00	µg/L	< 5.00 µg/L	U
cis-1,3-Dichloropropene	5.00	µg/L	< 5.00 µg/L	U
trans-1,3-Dichloropropene	5.00	µg/L	< 5.00 µg/L	U
Ethylbenzene	5.00	µg/L	< 5.00 µg/L	U
2-Hexanone	50.0	µg/L	< 50.0 µg/L	U
Bromomethane	5.00	µg/L	< 5.00 µg/L	U
Chloromethane	5.00	µg/L	< 5.00 µg/L	U
Dibromomethane	5.00	µg/L	< 5.00 µg/L	U
2-Butanone	100	µg/L	< 100 µg/L	U
Iodomethane	5.00	µg/L	< 5.00 µg/L	U

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REPORT NUMBER : D97-8703-4
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PAGE 3

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		44.9 µg/L	
Bromofluorobenzene (SS)		52.0 µg/L	
1,2-Dichloroethane-d4 (SS)		44.8 µg/L	
Dibromofluoromethane (SS)		47.1 µg/L	

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW45#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW45#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : TAP
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 25-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 2
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS						
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG	
Acenaphthene	30.6	µg/L	<	30.6	µg/L	U
Acenaphthylene	39.1	µg/L	<	39.1	µg/L	U
Anthracene	11.2	µg/L	<	11.2	µg/L	U
Benzo(a)anthracene	0.221	µg/L	<	0.221	µg/L	U
Benzo(a)pyrene	0.204	µg/L	<	0.204	µg/L	U
Benzo(b)fluoranthene	0.306	µg/L	<	0.306	µg/L	U
Benzo(g,h,i)perylene	1.29	µg/L	<	1.29	µg/L	U
Benzo(k)fluoranthene	0.289	µg/L	<	0.289	µg/L	U
Chrysene	2.55	µg/L	<	2.55	µg/L	U
Di(1,2,3-cd)anthracene	0.510	µg/L	<	0.510	µg/L	U
Fluoranthene	3.57	µg/L	<	3.57	µg/L	U
Fluorene	3.57	µg/L	<	3.57	µg/L	U
Indeno(1,2,3-cd)pyrene	0.731	µg/L	<	0.731	µg/L	U
Naphthalene	30.6	µg/L	<	30.6	µg/L	U

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REPORT NUMBER : D97-8703-4
ANALYSIS METHOD : EPA 8310 PR /1

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POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	10.9 µg/L	< 10.9 µg/L	U
Pyrene	4.59 µg/L	< 4.59 µg/L	U
p-Terphenyl (SS)		13.8 µg/L	



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REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW45#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
PREPARATION METHOD : EPA 3510B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 µg/L	63.0 µg/L	J
Triacontane (GS)		226 µg/L	



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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW45#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 9-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : CNA

PREPARED ON : 21-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : VHT

ANALYZED ON : 21-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 29072197RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	100 $\mu\text{g/L}$	17.2 $\mu\text{g/L}$	J
Fluorobenzene (SS)		47.2 $\mu\text{g/L}$	



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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW45#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 9-JUL-1997
ANALYSIS METHOD : RSK 175 /1
ANALYZED BY : LAJ
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : F071897-1

DISSOLVED GASES IN WATER			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methane	0.5 ppbw	< 0.5 ppbw	U



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW45#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 9-JUL-1997

TOTAL METALS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Lead /1	0.0020 mg/L	0.0071 mg/L	
Dilution Factor : 1 Prepared using EPA 3015 on 17-JUL-1997 by CEL Analyzed using EPA 7421 on 22-JUL-1997 by GGD QC Batch No : AC160-35F			

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-4

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW45#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 9-JUL-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Sulfate /1		0.20 mg/L		2.76 mg/L	
Dilution Factor : 1 Analyzed using EPA 9056 on 21-JUL-1997 by LKD QC Batch No : 32-0721971					



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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-6
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : FIELDQC#
: TB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

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REPORT NUMBER : D97-8703-6
ANALYSIS METHOD : EPA 8260 /1

PAGE 2

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	< 10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	< 25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	< 100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
Ethylbenzene	5.00 µg/L	< 5.00 µg/L	U
2-Hexanone	50.0 µg/L	< 50.0 µg/L	U
Bromomethane	5.00 µg/L	< 5.00 µg/L	U
Chloromethane	5.00 µg/L	< 5.00 µg/L	U
Dibromomethane	5.00 µg/L	< 5.00 µg/L	U
2-Butanone	100 µg/L	< 100 µg/L	U
Iodomethane	5.00 µg/L	< 5.00 µg/L	U

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REPORT NUMBER : D97-8703-6
ANALYSIS METHOD : EPA 8260 /1

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VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		50.7 µg/L	
Bromofluorobenzene (SS)		59.4 µg/L	
1,2-Dichloroethane-d4 (SS)		49.9 µg/L	
Dibromofluoromethane (SS)		53.0 µg/L	



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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-6
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : FIELDQC#
: TB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-7
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW3#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

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REPORT NUMBER : D97-8703-7
ANALYSIS METHOD : EPA 8260 /1

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VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	< 10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	< 25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	< 100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	< 5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	< 5.00 µg/L	U
Ethylbenzene	5.00 µg/L	< 5.00 µg/L	U
2-Hexanone	50.0 µg/L	< 50.0 µg/L	U
Bromomethane	5.00 µg/L	< 5.00 µg/L	U
Chloromethane	5.00 µg/L	< 5.00 µg/L	U
Dibromomethane	5.00 µg/L	< 5.00 µg/L	U
2-Butanone	100 µg/L	< 100 µg/L	U
Iodomethane	5.00 µg/L	< 5.00 µg/L	U

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Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8703-7
ANALYSIS METHOD : EPA 8260 /1

PAGE 3

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		48.2 µg/L	
Bromofluorobenzene (SS)		57.9 µg/L	
1,2-Dichloroethane-d4 (SS)		49.0 µg/L	
Dibromofluoromethane (SS)		51.4 µg/L	

ITS Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-7

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc.

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW3#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 10-JUL-1997

ANALYZED BY : MGD

ANALYZED ON : 17-JUL-1997

ANALYSIS METHOD : EPA 8260 /1

METHOD FACTOR : 1

QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N



Intertek Testing Services

Environmental Laboratories

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ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW3#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 10-JUL-1997

PREPARATION METHOD : EPA 3520B

PREPARED BY : TAP

PREPARED ON : 16-JUL-1997

ANALYSIS METHOD : EPA 8310 PR /1

ANALYZED BY : JXA

ANALYZED ON : 25-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	18.0 µg/L	< 18.0 µg/L	U
Acenaphthylene	23.0 µg/L	< 23.0 µg/L	U
Anthracene	6.60 µg/L	< 6.60 µg/L	U
Benzo(a)anthracene	0.130 µg/L	< 0.130 µg/L	U
Benzo(a)pyrene	0.120 µg/L	< 0.120 µg/L	U
Benzo(b)fluoranthene	0.180 µg/L	< 0.180 µg/L	U
Benzo(g,h,i)perylene	0.760 µg/L	< 0.760 µg/L	U
Benzo(k)fluoranthene	0.170 µg/L	< 0.170 µg/L	U
Chrysene	1.50 µg/L	< 1.50 µg/L	U
Dibenz(a,h)anthracene	0.300 µg/L	< 0.300 µg/L	U
Fluoranthene	2.10 µg/L	< 2.10 µg/L	U
Fluorene	2.10 µg/L	< 2.10 µg/L	U
Indeno(1,2,3-cd)pyrene	0.430 µg/L	< 0.430 µg/L	U
Naphthalene	18.0 µg/L	< 18.0 µg/L	U

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Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-7
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	6.40 µg/L	< 6.40 µg/L	U
Pyrene	2.70 µg/L	< 2.70 µg/L	U
p-Terphenyl (SS)		8.84 µg/L	

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Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-7

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW3#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 10-JUL-1997

PREPARATION METHOD : EPA 351.0B

PREPARED BY : KDF

PREPARED ON : 16-JUL-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 17-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG	
Total Extractable Hydrocarbons	1000	µg/L	97.0	µg/L	J
Triacontane (C33)			234	µg/L	



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-7

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW3#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 10-JUL-1997

PREPARATION METHOD : EPA 5030

PREPARED BY : LLB

PREPARED ON : 16-JUL-1997

ANALYSIS METHOD : EPA 5030/8015M /1

ANALYZED BY : VHT

ANALYZED ON : 20-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : 29072097RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Volatile Hydrocarbons	100	µg/L	46.5 µg/L J
Fluorobenzene (SS)			47.4 µg/L



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-7
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW3#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997

TOTAL METALS				
TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Lead	/1	0.0020 mg/L	< 0.0020 mg/L	U
Dilution Factor : 1 Prepared using EPA 3015 on 17-JUL-1997 by CEL Analyzed using EPA 7421 on 22-JUL-1997 by GGD QC Batch No : AC160-35F				



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-7
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW3#
: N1#{0-0'}
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Sulfate /1	0.20 mg/L	0.34 mg/L	
Dilution Factor : 1 Analyzed using EPA 9056 on 21-JUL-1997 by LKD QC Batch No : 32-072197I			



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER :: D97-8703-8
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	13.4 µg/L	
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

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Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-8
ANALYSIS METHOD : EPA 8260 /1

PAGE 2

VOLATILE ORGANICS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
2-Chloroethylvinyl ether	10.0	µg/L	< 10.0	µg/L	U
Dibromochloromethane	5.00	µg/L	< 5.00	µg/L	U
1,2-Dibromo-3-chloropropane	25.0	µg/L	< 25.0	µg/L	U
1,2-Dibromoethane	5.00	µg/L	< 5.00	µg/L	U
1,2-Dichlorobenzene	5.00	µg/L	< 5.00	µg/L	U
1,3-Dichlorobenzene	5.00	µg/L	< 5.00	µg/L	U
1,4-Dichlorobenzene	5.00	µg/L	< 5.00	µg/L	U
trans-1,4-Dichloro-2-butene	100	µg/L	< 100	µg/L	U
1,1-Dichloroethane	5.00	µg/L	< 5.00	µg/L	U
1,2-Dichloroethane	5.00	µg/L	< 5.00	µg/L	U
1,1-Dichloroethene	5.00	µg/L	< 5.00	µg/L	U
cis-1,2-Dichloroethene	5.00	µg/L	< 5.00	µg/L	U
trans-1,2-Dichloroethene	5.00	µg/L	< 5.00	µg/L	U
1,2-Dichloropropane	5.00	µg/L	< 5.00	µg/L	U
2,2-Dichloropropane	5.00	µg/L	< 5.00	µg/L	U
1,1-Dichloropropene	5.00	µg/L	< 5.00	µg/L	U
1,3-Dichloropropene	5.00	µg/L	< 5.00	µg/L	U
cis-1,3-Dichloropropene	5.00	µg/L	< 5.00	µg/L	U
trans-1,3-Dichloropropene	5.00	µg/L	< 5.00	µg/L	U
2-Hexanone	50.0	µg/L	< 50.0	µg/L	U
Bromomethane	5.00	µg/L	< 5.00	µg/L	U
Chloromethane	5.00	µg/L	< 5.00	µg/L	U
Dibromomethane	5.00	µg/L	< 5.00	µg/L	U
2-Butanone	100	µg/L	< 100	µg/L	U
Iodomethane	5.00	µg/L	< 5.00	µg/L	U
Methylene chloride	5.00	µg/L	< 5.00	µg/L	U

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Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-8
ANALYSIS METHOD : EPA 8260 /1

PAGE 3

VOLATILE ORGANICS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
4-Methyl-2-pentanone	100	µg/L	< 100 µg/L	U
Styrene	5.00	µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00	µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00	µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00	µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00	µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00	µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00	µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00	µg/L	< 5.00 µg/L	U
Trichloroethene	5.00	µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00	µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00	µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0	µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00	µg/L	< 2.00 µg/L	U
Toluene-d8 (SS)			49.0 µg/L	
Bromofluorobenzene (SS)			56.4 µg/L	
1,2-Dichloroethane-d4 (SS)			49.7 µg/L	
Dibromofluoromethane (SS)			50.7 µg/L	

ITS Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-8
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
Butane, 2-methyl-	2.09	VOA	58 ug/L	N
Pentane	2.37	VOA	29 ug/L	N
Cyclopropane, 1,1-dimethyl-	2.52	VOA	12 ug/L	N
Pentane, 3-methyl-	3.89	VOA	23 ug/L	N
3-Hexene, (2)-	4.61	VOA	12 ug/L	N
3-Hexyne	4.90	VOA	11 ug/L	N
Cyclopentane, methyl-	5.25	VOA	60 ug/L	N
2,4-Hexadiene	6.72	VOA	98 ug/L	N
Cyclohexane, methyl-	7.65	VOA	65 ug/L	N
3,5-Dimethylcyclopentene	8.34	VOA	28 ug/L	N
Benzene, (1-methylethyl)-	12.48	VOA	49 ug/L	N
Benzene, 2-ethyl-1,3-dimethyl-	13.86	VOA	11 ug/L	N
Benzene, 1-methyl-2-(1-methylethyl	14.35	VOA	15 ug/L	N



Intertek Testing Services
Environmental Laboratories

REPORT NUMBER : D97-8703-8
ANALYSIS METHOD : EPA 8260 /1

PAGE 2

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
1H-Indene, 2,3-dihydro-4-methyl-	14.84	VOA	13 ug/L	N
Naphthalene	15.51	VOA	669 ug/L	N

ITS Intertek Testing Services

Environmental Laboratories

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SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW4#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 10-JUL-1997

PREPARATION METHOD : EPA 3520B

PREPARED BY : TAP

PREPARED ON : 16-JUL-1997

ANALYSIS METHOD : EPA 8310 PR /1

ANALYZED BY : JXA

ANALYZED ON : 25-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	18.0 µg/L	< 18.0 µg/L	U
Acenaphthylene	23.0 µg/L	< 23.0 µg/L	U
Anthracene	6.60 µg/L	< 6.60 µg/L	U
Benzo(a)anthracene	0.130 µg/L	< 0.130 µg/L	U
Benzo(a)pyrene	0.120 µg/L	< 0.120 µg/L	U
Benzo(b)fluoranthene	0.180 µg/L	< 0.180 µg/L	U
Benzo(g,h,i)perylene	0.760 µg/L	< 0.760 µg/L	U
Benzo(k)fluoranthene	0.170 µg/L	< 0.170 µg/L	U
Chrysene	1.50 µg/L	< 1.50 µg/L	U
Dibenz(a,n)anthracene	0.300 µg/L	< 0.300 µg/L	U
Fluoranthene	2.10 µg/L	< 2.10 µg/L	U
Fluorene	2.10 µg/L	< 2.10 µg/L	U
Indeno(1,2,3-cd)pyrene	0.430 µg/L	< 0.430 µg/L	U
Naphthalene	18.0 µg/L	624 µg/L	

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Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-8
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	6.40 µg/L	< 6.40 µg/L	U
Pyrene	2.70 µg/L	< 2.70 µg/L	U
p-Terphenyl (SS)		6.50 µg/L	



Intertek Testing Services

Environmental Laboratories

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REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 3510B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Total Extractable Hydrocarbons	1000	µg/L	7500 µg/L	
Triacontane (SS)			231 µg/L	



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-8

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 50
METHOD FACTOR : 1
QC BATCH NO : 29072197RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	5000 µg/L	8930 µg/L	D
Fluorobenzene (SS)		2330 µg/L	D



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-8
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
ANALYSIS METHOD : RSK 175 /1
ANALYZED BY : LAJ
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : F071897-1

DISSOLVED GASES IN WATER			
TEST REQUESTED	DETECTION LIMIT		FLAG
Methane	0.5	ppbw	6.4 ppbw



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-8

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS

ID MARKS : GU-GMW4#

: N1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 10-JUL-1997

TOTAL METALS				
TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Lead /1		0.0020 mg/L	0.0069 mg/L	-
Dilution Factor : 1 Prepared using EPA 3015 on 17-JUL-1997 by CEL Analyzed using EPA 7421 on 22-JUL-1997 by GGD QC Batch No : AC160-35F				



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-8
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste: 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Sulfate /1		0.20 mg/L		0.18 mg/L	J.
Dilution Factor : 1 Analyzed using EPA 9056 on 21-JUL-1997 by LKD QC Batch No : 32-0721971					



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-9
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : FIELDQC#
: TB2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 11-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707187001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

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Environmental Laboratories

REPORT NUMBER : D97-8703-9
ANALYSIS METHOD : EPA 8260 /1

PAGE 2

VOLATILE ORGANICS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
2-Chloroethylvinyl ether	10.0	µg/L	< 10.0	µg/L	U
Dibromochloromethane	5.00	µg/L	< 5.00	µg/L	U
1,2-Dibromo-3-chloropropane	25.0	µg/L	< 25.0	µg/L	U
1,2-Dibromoethane	5.00	µg/L	< 5.00	µg/L	U
1,2-Dichlorobenzene	5.00	µg/L	< 5.00	µg/L	U
1,3-Dichlorobenzene	5.00	µg/L	< 5.00	µg/L	U
1,4-Dichlorobenzene	5.00	µg/L	< 5.00	µg/L	U
trans-1,4-Dichloro-2-butene	100	µg/L	< 100	µg/L	U
1,1-Dichloroethane	5.00	µg/L	< 5.00	µg/L	U
1,2-Dichloroethane	5.00	µg/L	< 5.00	µg/L	U
1,1-Dichloroethene	5.00	µg/L	< 5.00	µg/L	U
cis-1,2-Dichloroethene	5.00	µg/L	< 5.00	µg/L	U
trans-1,2-Dichloroethene	5.00	µg/L	< 5.00	µg/L	U
1,2-Dichloropropane	5.00	µg/L	< 5.00	µg/L	U
2,2-Dichloropropane	5.00	µg/L	< 5.00	µg/L	U
1,1-Dichloropropene	5.00	µg/L	< 5.00	µg/L	U
1,3-Dichloropropane	5.00	µg/L	< 5.00	µg/L	U
cis-1,3-Dichloropropene	5.00	µg/L	< 5.00	µg/L	U
trans-1,3-Dichloropropene	5.00	µg/L	< 5.00	µg/L	U
Ethylbenzene	5.00	µg/L	< 5.00	µg/L	U
2-Hexanone	50.0	µg/L	< 50.0	µg/L	U
Bromomethane	5.00	µg/L	< 5.00	µg/L	U
Chloromethane	5.00	µg/L	< 5.00	µg/L	U
Dibromomethane	5.00	µg/L	< 5.00	µg/L	U
2-Butanone	100	µg/L	< 100	µg/L	U
Iodomethane	5.00	µg/L	< 5.00	µg/L	U

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Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-9
ANALYSIS METHOD : EPA 8260 /1

PAGE 3

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U
Styrene	5.00 µg/L	< 5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U
Toluene	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U
o-Xylene	5.00 µg/L	< 5.00 µg/L	U
Toluene-d8 (SS)		50.5 µg/L	
Bromofluorobenzene (SS)		56.8 µg/L	
1,2-Dichloroethane-d4 (SS)		51.6 µg/L	
Dibromofluoromethane (SS)		50.2 µg/L	



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-9

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : FIELDQC#
: TB2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 11-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707187001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U

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Environmental Laboratories

REPORT NUMBER : D97-8703-10
ANALYSIS METHOD : EPA 8260 /1

PAGE 2

VOLATILE ORGANICS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	<	10.0 µg/L	U
Dibromochloromethane	5.00 µg/L	<	5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0 µg/L	<	25.0 µg/L	U
1,2-Dibromoethane	5.00 µg/L	<	5.00 µg/L	U
1,2-Dichlorobenzene	5.00 µg/L	<	5.00 µg/L	U
1,3-Dichlorobenzene	5.00 µg/L	<	5.00 µg/L	U
1,4-Dichlorobenzene	5.00 µg/L	<	5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100 µg/L	<	100 µg/L	U
1,1-Dichloroethane	5.00 µg/L	<	5.00 µg/L	U
1,2-Dichloroethane	5.00 µg/L	<	5.00 µg/L	U
1,1-Dichloroethene	5.00 µg/L	<	5.00 µg/L	U
cis-1,2-Dichloroethene	5.00 µg/L	<	5.00 µg/L	U
trans-1,2-Dichloroethene	5.00 µg/L	<	5.00 µg/L	U
1,2-Dichloropropane	5.00 µg/L	<	5.00 µg/L	U
2,2-Dichloropropane	5.00 µg/L	<	5.00 µg/L	U
1,1-Dichloropropene	5.00 µg/L	<	5.00 µg/L	U
1,3-Dichloropropane	5.00 µg/L	<	5.00 µg/L	U
cis-1,3-Dichloropropene	5.00 µg/L	<	5.00 µg/L	U
trans-1,3-Dichloropropene	5.00 µg/L	<	5.00 µg/L	U
Ethylbenzene	5.00 µg/L	<	5.00 µg/L	U
2-Hexanone	50.0 µg/L	<	50.0 µg/L	U
Bromomethane	5.00 µg/L	<	5.00 µg/L	U
Chloromethane	5.00 µg/L	<	5.00 µg/L	U
Dibromomethane	5.00 µg/L	<	5.00 µg/L	U
2-Butanone	100 µg/L	<	100 µg/L	U
Iodomethane	5.00 µg/L	<	5.00 µg/L	U

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Environmental Laboratories

REPORT NUMBER : D97-8703-10
ANALYSIS METHOD : EPA 8260 /1

PAGE 3

VOLATILE ORGANICS				
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG	
Methylene chloride	5.00 µg/L	< 5.00 µg/L	U	
4-Methyl-2-pentanone	100 µg/L	< 100 µg/L	U	
Styrene	5.00 µg/L	< 5.00 µg/L	U	
1,1,1,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U	
1,1,2,2-Tetrachloroethane	5.00 µg/L	< 5.00 µg/L	U	
Tetrachloroethene	5.00 µg/L	< 5.00 µg/L	U	
Toluene	5.00 µg/L	< 5.00 µg/L	U	
1,2,3-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U	
1,2,4-Trichlorobenzene	5.00 µg/L	< 5.00 µg/L	U	
1,1,1-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U	
1,1,2-Trichloroethane	5.00 µg/L	< 5.00 µg/L	U	
Trichloroethene	5.00 µg/L	< 5.00 µg/L	U	
Trichlorofluoromethane	5.00 µg/L	< 5.00 µg/L	U	
1,2,3-Trichloropropane	5.00 µg/L	< 5.00 µg/L	U	
1,3,5-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U	
1,2,4-Trimethylbenzene	5.00 µg/L	< 5.00 µg/L	U	
Vinyl acetate	50.0 µg/L	< 50.0 µg/L	U	
Vinyl chloride	2.00 µg/L	< 2.00 µg/L	U	
m,p-Xylene	5.00 µg/L	< 5.00 µg/L	U	
o-Xylene	5.00 µg/L	< 5.00 µg/L	U	
Toluene-d8 (SS)		53.2 µg/L		
Bromofluorobenzene (SS)		59.8 µg/L		
1,2-Dichloroethane-d4 (SS)		51.8 µg/L		
Dibromofluoromethane (SS)		51.7 µg/L		



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : TAP
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 24-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
Acenaphthene	18.0	µg/L	<	18.0 µg/L	U
Acenaphthylene	23.0	µg/L	<	23.0 µg/L	U
Anthracene	6.60	µg/L	<	6.60 µg/L	U
Benzo(a)anthracene	0.130	µg/L	<	0.130 µg/L	U
Benzo(a)pyrene	0.120	µg/L	<	0.120 µg/L	U
Benzo(b)fluoranthene	0.180	µg/L	<	0.180 µg/L	U
Benzo(g,h,i)perylene	0.760	µg/L	<	0.760 µg/L	U
Benzo(k)fluoranthene	0.170	µg/L	<	0.170 µg/L	U
Chrysene	1.50	µg/L	<	1.50 µg/L	U
Dibenz(a,n)anthracene	0.300	µg/L	<	0.300 µg/L	U
Fluoranthene	2.10	µg/L	<	2.10 µg/L	U
Fluorene	2.10	µg/L	<	2.10 µg/L	U
Indeno(1,2,3-cd)pyrene	0.430	µg/L	<	0.430 µg/L	U
Naphthalene	18.0	µg/L	<	18.0 µg/L	U

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Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8703-10
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	6.40 µg/L	< 6.40 µg/L	U
Pyrene	2.70 µg/L	< 2.70 µg/L	U
p-Terphenyl (SS)		8.51 µg/L	



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#

: LB1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 12-JUL-1997

PREPARATION METHOD : EPA 3510B

PREPARED BY : KDF

PREPARED ON : 16-JUL-1997

ANALYSIS METHOD : EPA 8015M /1

ANALYZED BY : VHL

ANALYZED ON : 17-JUL-1997

DILUTION FACTOR : 1

METHOD FACTOR : 1

QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 $\mu\text{g/L}$	89.0 $\mu\text{g/L}$	J
Triaccontane (SS)		195 $\mu\text{g/L}$	



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : VHT
PREPARED ON : 20-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 20-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072097RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	100 $\mu\text{g/L}$	< 100 $\mu\text{g/L}$	U
Fluorobenzene(3S)		47.3 $\mu\text{g/L}$	



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER.: D97-8703-10
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
ANALYSIS METHOD : RSK 175 /1
ANALYZED BY : LAJ
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : F071897-1

DISSOLVED GASES IN WATER			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methane	0.5 ppbw	< 0.5 ppbw	U
Ethane	0.5 ppbw	< 0.5 ppbw	U
Ethene	0.5 ppbw	< 0.5 ppbw	U



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997

TOTAL METALS				
TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Lead	/1	0.0020 mg/L	0.0017 mg/L	J
Dilution Factor : 1 Prepared using EPA 3015 on 17-JUL-1997 by CEL Analyzed using EPA 7421 on 22-JUL-1997 by GGD QC Batch No : AC160-35F				



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-10

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS

ID MARKS : LABQC#

: LB1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 12-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Sulfate /1	0.20 mg/L	< 0.20 mg/L	U
Dilution Factor : 1 Analyzed using EPA 9056 on 21-JUL-1997 by LKD QC Batch No : 32-0721971			



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-11

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS					
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG	
Acetone	20.0	µg/L	59.8	µg/L	
Acrylonitrile	5.00	µg/L	31.2	µg/L	
Benzene	5.00	µg/L	44.5	µg/L	
Bromobenzene	5.00	µg/L	46.1	µg/L	
Bromochloromethane	5.00	µg/L	43.4	µg/L	
Bromodichloromethane	5.00	µg/L	39.2	µg/L	
Bromoform	5.00	µg/L	29.3	µg/L	
Carbon disulfide	5.00	µg/L	39.8	µg/L	
Carbon tetrachloride	5.00	µg/L	41.9	µg/L	
Chlorobenzene	5.00	µg/L	46.5	µg/L	
Chloroethane	5.00	µg/L	52.2	µg/L	
Chloroform	5.00	µg/L	43.8	µg/L	
2-Chlorotoluene	5.00	µg/L	53.6	µg/L	
4-Chlorotoluene	5.00	µg/L	45.6	µg/L	

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Environmental Laboratories

REPORT NUMBER : D97-8703-11
ANALYSIS METHOD : EPA 8260 /1

PAGE 2

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	46.3 µg/L	
Dibromochloromethane	5.00 µg/L	36.0 µg/L	
1,2-Dibromo-3-chloropropane	25.0 µg/L	16.5 µg/L	J
1,2-Dibromoethane	5.00 µg/L	43.1 µg/L	
1,2-Dichlorobenzene	5.00 µg/L	44.5 µg/L	
1,3-Dichlorobenzene	5.00 µg/L	43.4 µg/L	
1,4-Dichlorobenzene	5.00 µg/L	42.2 µg/L	
trans-1,4-Dichloro-2-butene	100 µg/L	50.8 µg/L	J
1,1-Dichloroethane	5.00 µg/L	43.7 µg/L	
1,2-Dichloroethane	5.00 µg/L	44.4 µg/L	
1,1-Dichloroethene	5.00 µg/L	44.9 µg/L	
cis-1,2-Dichloroethene	5.00 µg/L	41.4 µg/L	
trans-1,2-Dichloroethene	5.00 µg/L	42.9 µg/L	
1,2-Dichloropropane	5.00 µg/L	46.3 µg/L	
2,2-Dichloropropane	5.00 µg/L	46.4 µg/L	
1,1-Dichloropropene	5.00 µg/L	44.9 µg/L	
1,3-Dichloropropane	5.00 µg/L	46.8 µg/L	
cis-1,3-Dichloropropene	5.00 µg/L	39.8 µg/L	
trans-1,3-Dichloropropene	5.00 µg/L	38.6 µg/L	
Ethylbenzene	5.00 µg/L	83.6 µg/L	
2-Hexanone	50.0 µg/L	43.2 µg/L	J
Bromomethane	5.00 µg/L	43.5 µg/L	
Chloromethane	5.00 µg/L	59.8 µg/L	
Dibromomethane	5.00 µg/L	43.9 µg/L	
2-Butanone	100 µg/L	41.0 µg/L	J
Iodomethane	5.00 µg/L	45.4 µg/L	



Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8703-11
ANALYSIS METHOD : EPA 8260 /1

PAGE 3

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	44.3 µg/L	
4-Methyl-2-pentanone	100 µg/L	34.9 µg/L	J
Styrene	5.00 µg/L	40.2 µg/L	
1,1,1,2-Tetrachloroethane	5.00 µg/L	42.8 µg/L	
1,1,2,2-Tetrachloroethane	5.00 µg/L	40.4 µg/L	
Tetrachloroethene	5.00 µg/L	48.6 µg/L	
Toluene	5.00 µg/L	43.0 µg/L	
1,2,3-Trichlorobenzene	5.00 µg/L	177 µg/L	
1,2,4-Trichlorobenzene	5.00 µg/L	50.4 µg/L	
1,1,1-Trichloroethane	5.00 µg/L	44.6 µg/L	
1,1,2-Trichloroethane	5.00 µg/L	42.5 µg/L	
Trichloroethene	5.00 µg/L	44.6 µg/L	
Trichlorofluoromethane	5.00 µg/L	50.7 µg/L	
1,2,3-Trichloropropane	5.00 µg/L	45.0 µg/L	
1,3,5-Trimethylbenzene	5.00 µg/L	45.5 µg/L	
1,2,4-Trimethylbenzene	5.00 µg/L	44.6 µg/L	
Vinyl acetate	50.0 µg/L	17.4 µg/L	J
Vinyl chloride	2.00 µg/L	46.9 µg/L	
m,p-Xylene	5.00 µg/L	85.1 µg/L	
o-Xylene	5.00 µg/L	42.9 µg/L	
Toluene-d8 (SS)		44.7 µg/L	
Bromofluorobenzene (SS)		51.3 µg/L	
1,2-Dichloroethane-d4 (SS)		47.0 µg/L	
Dibromofluoromethane (SS)		47.1 µg/L	



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-11

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N



Intertek Testing Services

Environmental Laboratories

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REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : TAP
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 24-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	18.0 µg/L	83.3 µg/L	
Acenaphthylene	23.0 µg/L	81.5 µg/L	
Anthracene	6.60 µg/L	74.2 µg/L	
Benzo(a)anthracene	0.130 µg/L	94.0 µg/L	
Benzo(a)pyrene	0.120 µg/L	91.0 µg/L	
Benzo(b)fluoranthene	0.180 µg/L	89.6 µg/L	
Benzo(g,h,i)perylene	0.760 µg/L	90.2 µg/L	
Benzo(k)fluoranthene	0.170 µg/L	86.2 µg/L	
Chrysene	1.50 µg/L	89.0 µg/L	
Dibenz(a,h)anthracene	0.300 µg/L	97.6 µg/L	
Fluoranthene	2.10 µg/L	91.7 µg/L	
Fluorene	2.10 µg/L	86.0 µg/L	
Indeno(1,2,3-cd)pyrene	0.430 µg/L	83.8 µg/L	
Naphthalene	18.0 µg/L	91.0 µg/L	

Intertek Testing Services NA Inc.
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Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8703-11
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	6.40 µg/L	82.3 µg/L	
Pyrene	2.70 µg/L	83.2 µg/L	
p-Terphenyl (SS)		7.94 µg/L	



Intertek Testing Services

Environmental Laboratories

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REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 3510B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Total Extractable Hydrocarbons	1000	µg/L	2380 µg/L	
Triacontane (SS)			231 µg/L	



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Environmental Laboratories

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REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : VHT
PREPARED ON : 20-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 20-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072097RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Volatile Hydrocarbons	100	µg/L	430 µg/L
Fluorobenzene-(S9)			47.3 µg/L



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-11

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
ANALYSIS METHOD : RSK 175 /1
ANALYZED BY : LAJ
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : F071897-1

DISSOLVED GASES IN WATER				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Methane	0.5	ppbw	3.9 ppbw	
Ethane	0.5	ppbw	7.8 ppbw	
Ethene	0.5	ppbw	< 0.5 ppbw	U



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-11

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS

ID MARKS : LABQC#
: BS1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 12-JUL-1997

TOTAL METALS				
TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Lead	/1	0.0020 mg/L	0.0201 mg/L	-
Dilution Factor : 1 Prepared using EPA 3015 on 17-JUL-1997 by CEL Analyzed using EPA 7421 on 22-JUL-1997 by GGD QC Batch No : AC160-35F				



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REPORT NUMBER : D97-8703-11

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Sulfate /1	0.20 mg/L	3.09 mg/L	-
Dilution Factor : 1 Analyzed using EPA 9056 on 21-JUL-1997 by LKD QC Batch No : 32-0721971			



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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-12
REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Ground Water for IRPIMS
ID MARKS : GU-GMW4#
: N2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 10-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 50
METHOD FACTOR : 1
QC BATCH NO : 9707187001

VOLATILE ORGANICS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Ethylbenzene	250	µg/L	1730 µg/L	D
Toluene	250	µg/L	2450 µg/L	D
1,3,5-Trimethylbenzene	250	µg/L	508 µg/L	D
1,2,4-Trimethylbenzene	250	µg/L	1380 µg/L	D
m,p-Xylene	250	µg/L	5530 µg/L	D
o-Xylene	250	µg/L	2810 µg/L	D
Toluene-d8 (SS)			50.4 µg/L	D
Bromofluorobenzene (SS)			60.8 µg/L	D
1,2-Dichloroethane-d4 (SS)			51.0 µg/L	D
Dibromofluoromethane (SS)			50.5 µg/L	D



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-13

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707187001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	< 20.0 µg/L	U
Acrylonitrile	5.00 µg/L	< 5.00 µg/L	U
Benzene	5.00 µg/L	< 5.00 µg/L	U
Bromobenzene	5.00 µg/L	< 5.00 µg/L	U
Bromochloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromodichloromethane	5.00 µg/L	< 5.00 µg/L	U
Bromoform	5.00 µg/L	< 5.00 µg/L	U
Carbon disulfide	5.00 µg/L	< 5.00 µg/L	U
Carbon tetrachloride	5.00 µg/L	< 5.00 µg/L	U
Chlorobenzene	5.00 µg/L	< 5.00 µg/L	U
Chloroethane	5.00 µg/L	< 5.00 µg/L	U
Chloroform	5.00 µg/L	< 5.00 µg/L	U
2-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U
4-Chlorotoluene	5.00 µg/L	< 5.00 µg/L	U



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-13
ANALYSIS METHOD : EPA 8260 /1

PAGE 2

VOLATILE ORGANICS					
TEST REQUESTED	DETECTION LIMIT		RESULTS		FLAG
2-Chloroethylvinyl ether	10.0	µg/L	<	10.0 µg/L	U
Dibromochloromethane	5.00	µg/L	<	5.00 µg/L	U
1,2-Dibromo-3-chloropropane	25.0	µg/L	<	25.0 µg/L	U
1,2-Dibromoethane	5.00	µg/L	<	5.00 µg/L	U
1,2-Dichlorobenzene	5.00	µg/L	<	5.00 µg/L	U
1,3-Dichlorobenzene	5.00	µg/L	<	5.00 µg/L	U
1,4-Dichlorobenzene	5.00	µg/L	<	5.00 µg/L	U
trans-1,4-Dichloro-2-butene	100	µg/L	<	100 µg/L	U
1,1-Dichloroethane	5.00	µg/L	<	5.00 µg/L	U
1,2-Dichloroethane	5.00	µg/L	<	5.00 µg/L	U
1,1-Dichloroethene	5.00	µg/L	<	5.00 µg/L	U
cis-1,2-Dichloroethene	5.00	µg/L	<	5.00 µg/L	U
trans-1,2-Dichloroethene	5.00	µg/L	<	5.00 µg/L	U
1,2-Dichloropropane	5.00	µg/L	<	5.00 µg/L	U
2,2-Dichloropropane	5.00	µg/L	<	5.00 µg/L	U
1,1-Dichloropropene	5.00	µg/L	<	5.00 µg/L	U
1,3-Dichloropropane	5.00	µg/L	<	5.00 µg/L	U
cis-1,3-Dichloropropene	5.00	µg/L	<	5.00 µg/L	U
trans-1,3-Dichloropropene	5.00	µg/L	<	5.00 µg/L	U
Ethylbenzene	5.00	µg/L	<	5.00 µg/L	U
2-Hexanone	50.0	µg/L	<	50.0 µg/L	U
Bromomethane	5.00	µg/L	<	5.00 µg/L	U
Chloromethane	5.00	µg/L	<	5.00 µg/L	U
Dibromomethane	5.00	µg/L	<	5.00 µg/L	U
2-Butanone	100	µg/L	<	100 µg/L	U
Iodomethane	5.00	µg/L	<	5.00 µg/L	U



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-13
ANALYSIS METHOD : EPA 8260 /1

PAGE 3

VOLATILE ORGANICS				
TEST REQUESTED	DETECTION LIMIT	RESULTS		FLAG
Methylene chloride	5.00 µg/L	<	5.00 µg/L	U
4-Methyl-2-pentanone	100 µg/L	<	100 µg/L	U
Styrene	5.00 µg/L	<	5.00 µg/L	U
1,1,1,2-Tetrachloroethane	5.00 µg/L	<	5.00 µg/L	U
1,1,2,2-Tetrachloroethane	5.00 µg/L	<	5.00 µg/L	U
Tetrachloroethene	5.00 µg/L	<	5.00 µg/L	U
Toluene	5.00 µg/L	<	5.00 µg/L	U
1,2,3-Trichlorobenzene	5.00 µg/L	<	5.00 µg/L	U
1,2,4-Trichlorobenzene	5.00 µg/L	<	5.00 µg/L	U
1,1,1-Trichloroethane	5.00 µg/L	<	5.00 µg/L	U
1,1,2-Trichloroethane	5.00 µg/L	<	5.00 µg/L	U
Trichloroethene	5.00 µg/L	<	5.00 µg/L	U
Trichlorofluoromethane	5.00 µg/L	<	5.00 µg/L	U
1,2,3-Trichloropropane	5.00 µg/L	<	5.00 µg/L	U
1,3,5-Trimethylbenzene	5.00 µg/L	<	5.00 µg/L	U
1,2,4-Trimethylbenzene	5.00 µg/L	<	5.00 µg/L	U
Vinyl acetate	50.0 µg/L	<	50.0 µg/L	U
Vinyl chloride	2.00 µg/L	<	2.00 µg/L	U
m,p-Xylene	5.00 µg/L	<	5.00 µg/L	U
o-Xylene	5.00 µg/L	<	5.00 µg/L	U
Toluene-d8 (SS)			50.2 µg/L	
Bromofluorobenzene (SS)			58.5 µg/L	
1,2-Dichloroethane-d4 (SS)			49.7 µg/L	
Dibromofluoromethane (SS)			49.2 µg/L	



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-13

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
ANALYZED BY : MGD
ANALYZED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
METHOD FACTOR : 1
QC BATCH NO : 9707187001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-13

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc.
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072197RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Volatile Hydrocarbons	100 µg/L	10.8 µg/L	J
Fluorobenzene (SS)		48.3 µg/L	



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-14

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 18-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707187001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	66.8 µg/L	
Acrylonitrile	5.00 µg/L	28.3 µg/L	
Benzene	5.00 µg/L	51.4 µg/L	
Bromobenzene	5.00 µg/L	55.3 µg/L	
Bromochloromethane	5.00 µg/L	22.1 µg/L	
Bromodichloromethane	5.00 µg/L	43.0 µg/L	
Bromoform	5.00 µg/L	32.0 µg/L	
Carbon disulfide	5.00 µg/L	43.2 µg/L	
Carbon tetrachloride	5.00 µg/L	45.9 µg/L	
Chlorobenzene	5.00 µg/L	53.8 µg/L	
Chloroethane	5.00 µg/L	56.4 µg/L	
Chloroform	5.00 µg/L	49.5 µg/L	
2-Chlorotoluene	5.00 µg/L	59.8 µg/L	
4-Chlorotoluene	5.00 µg/L	52.4 µg/L	



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-14
ANALYSIS METHOD : EPA 8260 /1

PAGE 2

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	38.5 µg/L	
Dibromochloromethane	5.00 µg/L	39.9 µg/L	
1,2-Dibromo-3-chloropropane	25.0 µg/L	41.9 µg/L	
1,2-Dibromoethane	5.00 µg/L	51.1 µg/L	
1,2-Dichlorobenzene	5.00 µg/L	50.1 µg/L	
1,3-Dichlorobenzene	5.00 µg/L	48.5 µg/L	
1,4-Dichlorobenzene	5.00 µg/L	49.4 µg/L	
trans-1,4-Dichloro-2-butene	100 µg/L	43.3 µg/L	J
1,1-Dichloroethane	5.00 µg/L	49.2 µg/L	
1,2-Dichloroethane	5.00 µg/L	50.4 µg/L	
1,1-Dichloroethene	5.00 µg/L	50.5 µg/L	
cis-1,2-Dichloroethene	5.00 µg/L	48.0 µg/L	
trans-1,2-Dichloroethene	5.00 µg/L	50.6 µg/L	
1,2-Dichloropropane	5.00 µg/L	38.5 µg/L	
2,2-Dichloropropane	5.00 µg/L	50.9 µg/L	
1,1-Dichloropropene	5.00 µg/L	50.6 µg/L	
1,3-Dichloropropane	5.00 µg/L	54.8 µg/L	
cis-1,3-Dichloropropene	5.00 µg/L	45.4 µg/L	
trans-1,3-Dichloropropene	5.00 µg/L	42.0 µg/L	
Ethylbenzene	5.00 µg/L	93.6 µg/L	
2-Hexanone	50.0 µg/L	60.6 µg/L	
Bromomethane	5.00 µg/L	41.1 µg/L	
Chloromethane	5.00 µg/L	64.4 µg/L	
Dibromomethane	5.00 µg/L	50.2 µg/L	
2-Butanone	100 µg/L	53.4 µg/L	J
Iodomethane	5.00 µg/L	39.9 µg/L	



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-14
ANALYSIS METHOD : EPA 8260 /1

PAGE 3

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	48.7 µg/L	
4-Methyl-2-pentanone	100 µg/L	45.9 µg/L	J
Styrene	5.00 µg/L	45.9 µg/L	
1,1,1,2-Tetrachloroethane	5.00 µg/L	48.0 µg/L	
1,1,2,2-Tetrachloroethane	5.00 µg/L	50.9 µg/L	
Tetrachloroethene	5.00 µg/L	55.6 µg/L	
Toluene	5.00 µg/L	50.0 µg/L	
1,2,3-Trichlorobenzene	5.00 µg/L	241 µg/L	
1,2,4-Trichlorobenzene	5.00 µg/L	60.8 µg/L	
1,1,1-Trichloroethane	5.00 µg/L	48.9 µg/L	
1,1,2-Trichloroethane	5.00 µg/L	49.7 µg/L	
Trichloroethene	5.00 µg/L	63.6 µg/L	
Trichlorofluoromethane	5.00 µg/L	55.4 µg/L	
1,2,3-Trichloropropane	5.00 µg/L	52.2 µg/L	
1,3,5-Trimethylbenzene	5.00 µg/L	51.2 µg/L	
1,2,4-Trimethylbenzene	5.00 µg/L	50.0 µg/L	
Vinyl acetate	50.0 µg/L	19.4 µg/L	J
Vinyl chloride	2.00 µg/L	52.0 µg/L	
m,p-Xylene	5.00 µg/L	95.4 µg/L	
o-Xylene	5.00 µg/L	49.3 µg/L	
Toluene-d8 (SS)		50.8 µg/L	
Bromofluorobenzene (SS)		57.0 µg/L	
1,2-Dichloroethane-d4 (SS)		51.8 µg/L	
Dibromofluoromethane (SS)		52.3 µg/L	



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-14

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072197RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Volatile Hydrocarbons	100	µg/L	507 µg/L
Fluorobenzene (S3)			47.6 µg/L



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-15

REPORT DATE : 18-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 17-JUL-1997
ANALYSIS METHOD : EPA 8260 /1
ANALYZED BY : MGD
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 9707177001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	71.0 µg/L	
Acrylonitrile	5.00 µg/L	36.9 µg/L	
Benzene	5.00 µg/L	46.9 µg/L	
Bromobenzene	5.00 µg/L	47.6 µg/L	
Bromochloromethane	5.00 µg/L	48.4 µg/L	
Bromodichloromethane	5.00 µg/L	41.7 µg/L	
Bromoform	5.00 µg/L	32.0 µg/L	
Carbon disulfide	5.00 µg/L	43.9 µg/L	
Carbon tetrachloride	5.00 µg/L	42.8 µg/L	
Chlorobenzene	5.00 µg/L	50.0 µg/L	
Chloroethane	5.00 µg/L	54.9 µg/L	
Chloroform	5.00 µg/L	47.5 µg/L	
2-Chlorotoluene	5.00 µg/L	47.8 µg/L	
4-Chlorotoluene	5.00 µg/L	50.2 µg/L	

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Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-15
ANALYSIS METHOD : EPA 8260 /1

PAGE 2

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	49.2 µg/L	
Dibromochloromethane	5.00 µg/L	39.4 µg/L	
1,2-Dibromo-3-chloropropane	25.0 µg/L	45.1 µg/L	
1,2-Dibromoethane	5.00 µg/L	46.4 µg/L	
1,2-Dichlorobenzene	5.00 µg/L	48.5 µg/L	
1,3-Dichlorobenzene	5.00 µg/L	47.4 µg/L	
1,4-Dichlorobenzene	5.00 µg/L	44.9 µg/L	
trans-1,4-Dichloro-2-butene	100 µg/L	43.3 µg/L	J
1,1-Dichloroethane	5.00 µg/L	47.8 µg/L	
1,2-Dichloroethane	5.00 µg/L	47.8 µg/L	
1,1-Dichloroethene	5.00 µg/L	47.6 µg/L	
cis-1,2-Dichloroethene	5.00 µg/L	46.3 µg/L	
trans-1,2-Dichloroethene	5.00 µg/L	48.8 µg/L	
1,2-Dichloropropane	5.00 µg/L	49.2 µg/L	
2,2-Dichloropropane	5.00 µg/L	50.1 µg/L	
1,1-Dichloropropene	5.00 µg/L	50.4 µg/L	
1,3-Dichloropropane	5.00 µg/L	48.6 µg/L	
cis-1,3-Dichloropropene	5.00 µg/L	42.2 µg/L	
trans-1,3-Dichloropropene	5.00 µg/L	39.9 µg/L	
Ethylbenzene	5.00 µg/L	48.2 µg/L	
2-Hexanone	50.0 µg/L	43.3 µg/L	J
Bromomethane	5.00 µg/L	48.5 µg/L	
Chloromethane	5.00 µg/L	64.5 µg/L	
Dibromomethane	5.00 µg/L	45.7 µg/L	
2-Butanone	100 µg/L	45.4 µg/L	J
Iodomethane	5.00 µg/L	49.8 µg/L	



Intertek Testing Services

Environmental Laboratories

REPORT NUMBER : D97-8703-15
ANALYSIS METHOD : EPA 8260 /1

PAGE 3

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	46.8 µg/L	
4-Methyl-2-pentanone	100 µg/L	39.2 µg/L	J
Styrene	5.00 µg/L	43.5 µg/L	
1,1,1,2-Tetrachloroethane	5.00 µg/L	46.2 µg/L	
1,1,2,2-Tetrachloroethane	5.00 µg/L	44.5 µg/L	
Tetrachloroethene	5.00 µg/L	52.2 µg/L	
Toluene	5.00 µg/L	45.6 µg/L	
1,2,3-Trichlorobenzene	5.00 µg/L	276 µg/L	
1,2,4-Trichlorobenzene	5.00 µg/L	65.2 µg/L	
1,1,1-Trichloroethane	5.00 µg/L	48.1 µg/L	
1,1,2-Trichloroethane	5.00 µg/L	46.0 µg/L	
Trichloroethene	5.00 µg/L	48.5 µg/L	
Trichlorofluoromethane	5.00 µg/L	54.5 µg/L	
1,2,3-Trichloropropane	5.00 µg/L	49.0 µg/L	
1,3,5-Trimethylbenzene	5.00 µg/L	48.4 µg/L	
1,2,4-Trimethylbenzene	5.00 µg/L	46.1 µg/L	
Vinyl acetate	50.0 µg/L	21.8 µg/L	J
Vinyl chloride	2.00 µg/L	51.0 µg/L	
m,p-Xylene	5.00 µg/L	87.0 µg/L	
o-Xylene	5.00 µg/L	46.7 µg/L	
Toluene-d8 (SS)		49.0 µg/L	
Bromofluorobenzene (SS)		55.5 µg/L	
1,2-Dichloroethane-d4 (SS)		51.6 µg/L	
Dibromofluoromethane (SS)		52.2 µg/L	



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-15

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : GWG
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8310 PR /1
ANALYZED BY : JXA
ANALYZED ON : 24-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-74

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acenaphthene	18.0 µg/L	89.7 µg/L	
Acenaphthylene	23.0 µg/L	33.4 µg/L	
Anthracene	6.60 µg/L	80.3 µg/L	
Benzo(a)anthracene	0.130 µg/L	102 µg/L	
Benzo(a)pyrene	0.120 µg/L	98.4 µg/L	
Benzo(b)fluoranthene	0.180 µg/L	96.9 µg/L	
Benzo(g,h,i)perylene	0.760 µg/L	97.9 µg/L	
Benzo(k)fluoranthene	0.170 µg/L	93.1 µg/L	
Chrysene	1.50 µg/L	96.2 µg/L	
Dibenz(a,n)anthracene	0.300 µg/L	106 µg/L	
Fluoranthene	2.10 µg/L	99.6 µg/L	
Fluorene	2.10 µg/L	92.7 µg/L	
Indeno(1,2,3-cd)pyrene	0.430 µg/L	90.6 µg/L	
Naphthalene	18.0 µg/L	100 µg/L	

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REPORT NUMBER : D97-8703-15
ANALYSIS METHOD : EPA 8310 PR /1

PAGE 2

POLYNUCLEAR AROMATIC HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Phenanthrene	6.40 µg/L	88.6 µg/L	
Pyrene	2.70 µg/L	90.4 µg/L	
p-Terphenyl (SS)		8.62 µg/L	



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Environmental Laboratories

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REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 3520B
PREPARED BY : KDF
PREPARED ON : 16-JUL-1997
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 17-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : AC142-77

TOTAL EXTRACTABLE HYDROCARBONS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Total Extractable Hydrocarbons	1000	µg/L	2150	µg/L
Triacontane (SS)			216	µg/L



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER.: D97-8703-15

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 21-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 21-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072097RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Volatile Hydrocarbons	100	µg/L	486 µg/L
Fluorobenzene (SS)			48.4 µg/L

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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-15

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD1#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 12-JUL-1997
ANALYSIS METHOD : RSK 175 /1
ANALYZED BY : LAJ
ANALYZED ON : 18-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : F071897-1

DISSOLVED GASES IN WATER				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Methane	0.5	ppbw	3.7 ppbw	
Ethane	0.5	ppbw	7.4 ppbw	
Ethene	0.5	ppbw	< 0.5 ppbw	U



Intertek Testing Services Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-15

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc.

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS

ID MARKS : LABQC#

: BD1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 12-JUL-1997

TOTAL METALS				
TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Lead	/1	0.0020 mg/L	< 0.0020 mg/L	U
Dilution Factor : 1 Prepared using EPA 3015 on 17-JUL-1997 by CEL Analyzed using EPA 7421 on 22-JUL-1997 by GGD QC Batch No : AC160-35F				



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DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-15

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc

ADDRESS : 1700 Broadway, Ste. 900

: Denver, CO 80290

ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS

ID MARKS : LABQC#

: BD1#(0-0')

PROJECT : 726876.24120 Gunter Annex

DATE SAMPLED : 12-JUL-1997

MISCELLANEOUS ANALYSES					
TEST REQUESTED		DETECTION LIMIT		RESULTS	FLAG
Sulfate /1		0.20 mg/L		3.15 mg/L	-
Dilution Factor : 1 Analyzed using EPA 9056 on 21-JUL-1997 by LKD QC Batch No : 32-072197I					

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Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-16

REPORT DATE : 18-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
 ADDRESS : 1700 Broadway, Ste. 900
 : Denver, CO 80290
 ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
 ID MARKS : LABQC#
 : BD2#(0-0')
 PROJECT : 726876.24120 Gunter Annex
 DATE SAMPLED : 22-JUL-1997
 PREPARATION METHOD : EPA 5030
 PREPARED BY : MGD
 PREPARED ON : 18-JUL-1997
 ANALYSIS METHOD : EPA 8260 /1
 ANALYZED BY : MGD
 ANALYZED ON : 18-JUL-1997
 DILUTION FACTOR : 1
 METHOD FACTOR : 1
 QC BATCH NO : 9707187001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	20.0 µg/L	92.2 µg/L	
Acrylonitrile	5.00 µg/L	26.0 µg/L	
Benzene	5.00 µg/L	51.1 µg/L	
Bromobenzene	5.00 µg/L	53.4 µg/L	
Bromochloromethane	5.00 µg/L	49.5 µg/L	
Bromodichloromethane	5.00 µg/L	43.3 µg/L	
Bromoform	5.00 µg/L	31.9 µg/L	
Carbon disulfide	5.00 µg/L	44.8 µg/L	
Carbon tetrachloride	5.00 µg/L	45.7 µg/L	
Chlorobenzene	5.00 µg/L	54.3 µg/L	
Chloroethane	5.00 µg/L	58.2 µg/L	
Chloroform	5.00 µg/L	49.2 µg/L	
2-Chlorotoluene	5.00 µg/L	60.9 µg/L	
4-Chlorotoluene	5.00 µg/L	53.0 µg/L	

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Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8703-16
ANALYSIS METHOD : EPA 8260 /1

PAGE 2

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
2-Chloroethylvinyl ether	10.0 µg/L	53.3 µg/L	
Dibromochloromethane	5.00 µg/L	40.5 µg/L	
1,2-Dibromo-3-chloropropane	25.0 µg/L	47.4 µg/L	
1,2-Dibromoethane	5.00 µg/L	53.2 µg/L	
1,2-Dichlorobenzene	5.00 µg/L	51.8 µg/L	
1,3-Dichlorobenzene	5.00 µg/L	52.5 µg/L	
1,4-Dichlorobenzene	5.00 µg/L	48.2 µg/L	
trans-1,4-Dichloro-2-butene	100 µg/L	54.2 µg/L	J
1,1-Dichloroethane	5.00 µg/L	50.8 µg/L	
1,2-Dichloroethane	5.00 µg/L	51.5 µg/L	
1,1-Dichloroethene	5.00 µg/L	53.1 µg/L	
cis-1,2-Dichloroethene	5.00 µg/L	49.7 µg/L	
trans-1,2-Dichloroethene	5.00 µg/L	51.1 µg/L	
1,2-Dichloropropane	5.00 µg/L	53.3 µg/L	
2,2-Dichloropropane	5.00 µg/L	23.6 µg/L	
1,1-Dichloropropene	5.00 µg/L	59.3 µg/L	
1,3-Dichloropropane	5.00 µg/L	53.6 µg/L	
cis-1,3-Dichloropropene	5.00 µg/L	45.2 µg/L	
trans-1,3-Dichloropropene	5.00 µg/L	43.1 µg/L	
Ethylbenzene	5.00 µg/L	96.8 µg/L	
2-Hexanone	50.0 µg/L	61.4 µg/L	
Bromomethane	5.00 µg/L	43.8 µg/L	
Chloromethane	5.00 µg/L	69.9 µg/L	
Dibromomethane	5.00 µg/L	50.1 µg/L	
2-Butanone	100 µg/L	60.9 µg/L	J
Iodomethane	5.00 µg/L	39.5 µg/L	



Intertek Testing Services Environmental Laboratories

REPORT NUMBER : D97-8703-16
ANALYSIS METHOD : EPA 8260 /1

PAGE 3

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Methylene chloride	5.00 µg/L	50.2 µg/L	
4-Methyl-2-pentanone	100 µg/L	49.3 µg/L	J
Styrene	5.00 µg/L	45.6 µg/L	
1,1,1,2-Tetrachloroethane	5.00 µg/L	48.6 µg/L	
1,1,2,2-Tetrachloroethane	5.00 µg/L	51.7 µg/L	
Tetrachloroethene	5.00 µg/L	53.5 µg/L	
Toluene	5.00 µg/L	50.2 µg/L	
1,2,3-Trichlorobenzene	5.00 µg/L	309 µg/L	
1,2,4-Trichlorobenzene	5.00 µg/L	68.9 µg/L	
1,1,1-Trichloroethane	5.00 µg/L	50.6 µg/L	
1,1,2-Trichloroethane	5.00 µg/L	49.8 µg/L	
Trichloroethene	5.00 µg/L	61.0 µg/L	
Trichlorofluoromethane	5.00 µg/L	55.6 µg/L	
1,2,3-Trichloropropane	5.00 µg/L	60.1 µg/L	
1,3,5-Trimethylbenzene	5.00 µg/L	51.4 µg/L	
1,2,4-Trimethylbenzene	5.00 µg/L	49.9 µg/L	
Vinyl acetate	50.0 µg/L	13.2 µg/L	J
Vinyl chloride	2.00 µg/L	53.7 µg/L	
m,p-Xylene	5.00 µg/L	98.5 µg/L	
o-Xylene	5.00 µg/L	51.3 µg/L	
Toluene-d8 (SS)		52.9 µg/L	
Bromofluorobenzene (SS)		55.2 µg/L	
1,2-Dichloroethane-d4 (SS)		53.0 µg/L	
Dibromofluoromethane (SS)		51.6 µg/L	



Intertek Testing Services

Environmental Laboratories

DATE RECEIVED : 12-JUL-1997

REPORT NUMBER : D97-8703-16

REPORT DATE : 14-AUG-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. John Hall

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BD2#(0-0')
PROJECT : 726876.24120 Gunter Annex
DATE SAMPLED : 22-JUL-1997
PREPARATION METHOD : EPA 5030
PREPARED BY : CNA
PREPARED ON : 22-JUL-1997
ANALYSIS METHOD : EPA 5030/8015M /1
ANALYZED BY : VHT
ANALYZED ON : 22-JUL-1997
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 29072197RB

TOTAL VOLATILE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT		FLAG
Total Volatile Hydrocarbons	100	µg/L	464 µg/L
Fluorobenzene (SS)			47.5 µg/L

DESCRIPTION OF REPORTING FLAGS

- U - Indicates compound was analyzed for but not detected.
- J - Indicates an estimated value. This flag is used if the compound is detected but is below the Reporting Limit.
- D - Indicates all compounds in an analysis at a secondary dilution.
- N - Indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds where the identification is based on a mass spectral library search.
- E - Indicates the compounds whose concentration exceed the limit of the instrument or the Laboratory Information Management System. The concentration will be greater than the concentration listed.
- Q - Indicates the surrogate recovery is outside the defined QC limits.
- M - Indicates the matrix has interfered with the recovery of the surrogates.
- O - Indicates the surrogate was lost because of dilution.